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## ORIGINAL COMMUNICATIONS.

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### THE SURGERY OF EXTERNAL NASAL DEFORMITIES.\*

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This subject has been and is yet, to a great extent, treated by the general surgeon, notwithstanding the fact that detail intra-nasal surgery is often necessary to obtain the best results. Again, a large majority of external nasal deformities are treated by charlatans because general surgeons, as well as rhinologists, often refuse and discourage treatment of the above named conditions for cosmetic purposes. This fact, I believe, is responsible for many bad results, accidents, and malformations, rather than improvements. Many such patients belong to the care of a neurologist, and should receive the strictest attention, and by all means prevent them from falling into the hands of an unskilled so-called specialist or beauty-doctor.

The various external nasal deformities that one commonly meets with may be grouped as follows:

1. Those due to marked deflections and irregularities of the septum.
2. Those dependent upon a deformity of the structures of the external nose, as the nasal bones, nasal and alveolar process of the superior maxilla, and the alar cartilages, columnna, with the skin covering all the above named structures. This includes the vestibular areas.

Of the first group, one of the most frequent deformities one meets with is the twisted or crooked nose. (Fig. I.) This may

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Fig. 1. Twisted or Crooked Nose.



Fig. 2. Notched Nose.



Fig. 3. Squashed or Flat Nose.

vary in degree, and be to either side. As a rule, there is associated with it a hump or more or less prominence; also a dislocation of the anterior triangular cartilage of the septum into one of the nostrils is frequently found.

Another variety of the first group is the notched nose, (Fig. II), that is, the bridge of the nose which is made up by the cartilaginous septum alone, is caved in. This is usually due to some pathological condition, as lues, tuberculosis and pyogenic infection and destruction of the cartilaginous septum, with secondary contraction.

A third variety is the squashed or flattened nose. (Fig. III.)



Fig. 4. Congenital Flat Nose.



Fig. 5. Large Hump Nose.

This condition is due to the traumatic severance of the anterior triangular cartilage from the bony septum, or the latter may be also involved in the process. This is frequently found in prize fighters, football players, or in consequence of a heavy fall on the nose.

A fourth variety, resembling very much the last named one, is that of congenital absence of the maxillary spine and underlying bony tissues of the alveolar process—in other words, the median portion of the premaxillary bones. In consequence of this deficiency, there is a complete lack of resiliency to the tip of the nose, and a distinct folding in or notched appearance at the junction of the nasal frenum and upper lip. (Fig. IV.)

Of the second group, namely, dependent on affection of the external structures, there are very many more varieties and the intranasal structures may be frequently associated in the changed process.

1. The large hump nose (Fig. V.) The nasal bones are massive, curved and large. X-ray pictures show a distinct increase in the thickness of bone. This deformity is characteristic of the Semitic race.

2. The broad bridge or flat nose. (Fig. VI.) In these cases the soft parts, as well as the bony framework, are flattened out.



Fig. 6, 7. Saddle Nose.



Fig. 8. Saddle Nose Cast.

The interior of the nose is usually very roomy and short antero-posteriorly.

3. Marked saddle nose (Fig. VII.), not due to any pathological condition. The one characteristic and objectionable thing is the much turned up tip of the nose, and very large anterior external naris.

4. Saddle nose (Fig. VIII.), due to pathological conditions, particularly in the late stages of lues, or in congenital lues. These cases are associated with, or follow closely upon, severe intranasal ulcerative processes, with necrosis of the septum, nasal bones, lateral wall of the nose. Very frequently the hard palate or floor of the





Fig. 9. Pushed in Nose.



Fig. 10. Pushed in Nose.



Fig. 11. Pushed-in Nose.

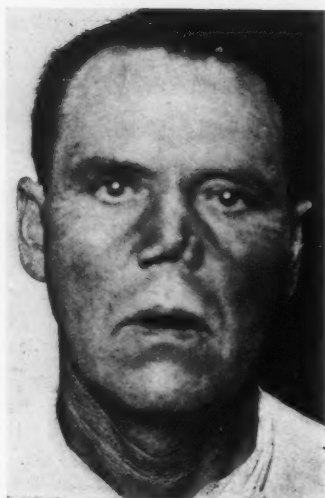


Fig. 12. Unilateral Deformity.



Fig. 14. Pound Nose.

nose is simultaneously affected, and a sequestration with a perforation follows. The soft parts of the external nose may also be attacked and destroyed. The ultimate result of this marked pathological process is cicatricial contraction, which finally causes the great deformities.

5. The so-called pushed-in nose. (Figs. IX, X, XI.) This is seen in cases where the nasal bones are not collapsed, but simply all the soft parts are affected, including all or most of the septum. Some of the cases have the skin drawn tightly across the former tip of the nose, that is, from one fossa pyriforma to the opposite. In some it is exulcerative, and the nasal mucous membrane is constantly exposed. In some the skin is drawn away in and up, making a large cavity where the protruding nose was formerly situated.



Fig. 13. Hare-Lip Nose.

The anterior nares are usually represented as two small irregular openings. The cause of such an affection is late syphilis, although lupus, rhinoscleroma and tuberculosis can cause the same trouble. A very infectious process (furuncle) has been followed by the above named deformity.

6. Traumatic destructions and irregular deformities cannot be described, except each case by itself. It may take on any of the forms or appearances mentioned, or a combination of them.

7. Unilateral deformity (Fig. XII.) usually right, through the alar region, is frequently seen in consequence of tuberculosis, although leucic cases of that kind are quite frequent in the literature.

8. Hare-lip nose. (Fig. XIII.) This may be unilateral or bilateral. It may be a large gap right through into the nasal cavity, or it may have been already repaired. While it may have been the best

result the surgeon could obtain when he repaired the hare-lip, still the nose does not look absolutely normal. Usually the alae are not properly fixed, and in consequence the nostrils look broad and out of shape.

9. The pinched nose. In cases of healed-out lupus, especially of the tip and vestibule, cicatrices form in such a case as though the tip of the nose was being constantly pinched. It looks very small and out of proportion to the rest of the nose.

10. The poun nose (Fig. XIV.) (Pfund Nase). This is the large bulbous end of the nose in acne rosacea. These vary in



FIG. 15. Hacked Off Nose.



FIG. 16. Exulcerated Nose and Face.

size and degree. Small and large excrescences stud the whole surface of the nose and the neighboring portions of the face are spotted and eczematous. Cases are on record, (the author has seen one), where the pediculated tumor springing from the nose was as large as a small apple hanging by the pedicle. This is a true pathological condition of an atheromatous character, and is found most frequently in drinkers of alcoholics.

11. Hacked off nose. (Fig. XV.) A deformity very rarely seen in this country, but a common condition among the women in the orient, where punishment is dealt out in such a manner as to cut off the soft portions, including cartilages of the noses, and leav-

ing it to heal by granulations. In sword duels and in war times, this accident has occurred. Accidentally this condition has occurred, as a plate of glass, etc., may cut off the whole, or a portion of the nose. The author knows a few cases where the latter accident has happened.

12. Exulcerated Nose and Face. (Fig. XVI.)

These are usually luetic patients, and especially in children (congenital). The process takes on the form of a granuloma, and is often mistaken for a tubercular process. The skin covering the nose, cheeks, eyelids and forehead, as also the upper lip, exulcerates; the cartilaginous portion of the external nose is fairly well preserved. In some cases bony destruction also accompanies the process. Cicatrization is very slow, and a more unsightly picture cannot be imagined, with the nasal secretion constantly bathing the face.

These illustrations of deformities are the cases out of my practice or referred to me by other physicians, and some will be shown later corrected.

I have purposely used very commonplace terms in classifying these deformities, because they are most frequently so spoken of.

Plastic surgery principles, especially when flaps are used:

1. Proper measurements of the flaps must be made as to their shapes and sizes so as to cover the defect.
2. Always allow for shrinkage of flaps.
3. Do not make the flaps too thin and jeopardize their life. When pedicles are used, see that they are not too narrow, so that plenty of blood supply enters the flaps.
4. Do not twist the pedicle too acutely and thereby strangulate the flap.
5. Thoroughly freshen surfaces of the defective area and undermine the edges properly so as to insure good union of the flaps.
6. Never use much tension on the flaps, and a counter incision in the vicinity may be necessary to relieve tension.
7. Perfect adaptation of the wound edges is imperative, and exact suturing is desirable; at the same time, do not place the sutures too close to one another, because death of the edges may take place from strangulation.
8. The finest of needles and suture material should be used. Horsehair makes excellent material. Handle the flap with great care by not using too large a rat-tooth forceps.

9. If, in the next day or two, the flap looks anemic and edematous or blue and blistered, one may have to relieve some sutures and apply warm compresses. A few small punctures with the knife in the edematous skin is at times of value.

10. Time is an important element in these operations, in that it requires a great deal of it. Do not work fast.

The indications for the correction of external nasal deformities are:

1. To establish a proper respiratory organ and correct all the pathological conditions dependent upon the imperfect ventilation and drainage. These are the cases that obstruct the anterior nares principally.

2. Cosmetic purposes. Two distinct indications may be mentioned here, namely, (a) where the deformity is of such a type as to prevent the individual from being permitted to associate with other people, owing to the obnoxious appearance, of being denied the same privileges as others, and of finding a suitable occupation. For example, I know an excellent mechanic who could not find employment, owing to his external nasal deformity. The other workers in the shop refused to work beside him or to handle any of his work. Many of these individuals will hide and veil their faces—in fact, many will remain in seclusion constantly rather than be subjects of curiosity and comment. (b) The second indication for cosmetic purposes is by far the larger number. I had intended to place this group of cases as contraindications at first, but reconsidered the matter in order to establish a point for discussion as to the limitation of correcting these deformities. I allude to the individual who does not like the shape of his nose. It is either too long or too short, flat or humped, crooked and twisted. The point is too long, broad, thick, flat, curved too much, or turned up too far. There may be a slight irregularity over the bridge of the nose or a slight depression. In fact, a number of deformities may present themselves. These are the cases which present themselves by the hundreds to the beauty doctors, and, as a rule, are spurned and discouraged by physicians. Those of you who have seen some of these cases after they were corrected by these so-called specialists, wonder if you have not acted unwisely by refusing to listen to these unfortunate individuals. I am inclined to believe that there is a slight mental unbalance, referable especially to this subject of their nasal deformities, and I am sure that every one has seen morose and melancholy individuals who were conscious

of the fact that they have slightly deformed noses. The indication in these cases is possibly to refer them to a neurologist; but his counsel and treatment will not cure them. Now, since these cases occur principally among the better class of people, if one is convinced that they will carry out their way of having a slight deformity corrected, if the patient is not willing to listen to reason and leave the matter alone, may not the indication be present for us to correct these deformities, rather than permit these patients to drift into unskilled hands, especially into the hands of those who are not well versed in surgical principles, for oftentimes such patients may be fleeced out of large sums of money. It must not be forgotten that most of these individuals are never absolutely pleased and satisfied with their results, and from this standpoint I find they had better be left alone. There is, however, a suggestion to offer, and that is to have, before operation, a signed agreement that the patient assumes all the consequences so far as the cosmetic effect is concerned.

Again, I wish to be distinctly understood that I am making this indication for the purpose of discussion only, for I have heretofore always refused to correct these deformities, and will continue to do so, unless my point is well taken.

In order to correct an external nasal deformity, one should have a pretty good idea as to what shape the nose should have after correction. This is important in association with the rest of the facial and body expressions. The best guide is naturally a picture or cast of the nose previous to its deformity. However, this is not always obtainable, and one should have a good idea of the conformation of facial expression and lines. I have made a close and careful study of this subject and find that Vanderpoel's text-book is the best suited to attain this.

The majority of the results obtainable in grave external nasal deformities, where plastic surgery was necessary, and especially in the transplantation of flaps, are anything but perfect—in fact, most of the noses that I have seen following these results are ugly. At the same time, the improvement, considering the original, especially in those cases where ulcerative processes and exposure of the nasal mucous membrane are present, is so marked as to have the gratitude of these patients without comparison. Right here, I want to say that that is principally all you do get—a great deal of work and appreciation. I mean to say that most of these cases occur among the poor. It is the persistence of labor that finally

brings results, and one must never feel discouraged when, for example, he has made a fine flap and all looks well right after the operation, when he finds a few days later that the whole flap has sloughed, and the work has to be done over again. It is not rare to have ten or fifteen sittings before a plastic operation on the nose is completed.

#### METHODS.

The various methods of correcting external nasal deformities are principally two, namely, (1) intranasally, or intravestibularly; (2) externally.

Since the other gentlemen in this symposium are going to treat the subjects of intra-nasal methods of correcting nasal deformities as well as paraffin methods, I shall omit that portion of nasal plastic, except referring to it incidentally, and show some results following that method of procedure. The principal methods in vogue for external corrections are:

1. Indian methods,
2. Italian methods,
3. German or French methods,
4. Miscellaneous methods.

The Indian method purposes to replace the defective or absent portion of the nose by using a pediculated flap consisting either of skin and subcutaneous tissue from the forehead, or it may contain the periosteum and external table of the frontal bone. Figs. XVII and XVIII show such a method in a case of marked traumatic destruction of the nasal bones and loss of skin. The flap, with its pedicle severed after ten days, is seen, as is also the bone-periosteal skin defect. This latter is covered with a skin graft. When bone is not removed, or when the skin is very loose, the defect may be covered primarily by bringing the skin into approximation, as will be shown by Case I.

The Italian method purposes to replace the defect or absent nose by using skin flaps from the arm or forearm. Figs. XIX and XX show a young man who had a marked ulceration destruction of his nose and lip, following congenital lues. His left arm was prepared, and a large pediculated flap was made, consisting of skin and much subcutaneous connective tissue to give the flap considerable body and nourishment. It is sutured on a previously prepared surface on more than half of the nose. The arm is fixed and immobilized by plaster cast, and kept in that position for about ten days, during which time the wound can be observed and



dressed. After that period the pedicle is detached from the arm and allowed to remain for a day or two, so that it should shrink and get firmer before it is sutured and conformed to make the nose. This picture shows well the two principal steps in the procedure.

The German or French methods purpose to cover the defect or replace the absent nose by obtaining flaps from the cheeks and other neighboring portions of the face. This method is particularly adopted for small unilateral defects, or the formation of a columna from the upper lip. The formation of the alae is a very neat procedure from the cheeks. However, for large defects or complete absence of the nose these methods are not followed by good results.

Under the head of miscellaneous methods may be mentioned the use of the finger, which is implanted and held in position by holding the arm for a week or two in a plaster cast, then amputate at the second joint, or even at the metacarpophalangeal articulation, and thus obtain a firm septum and skin cover. This method is not greatly favored.

The introduction of bone or other foreign substances, as gold, silver, hard rubber, etc., in saddle noses, as well as the exsection of bone in hump noses, will be described in connection with cases, as will also other methods of procedure.

Since there are many varieties of external nasal deformities, and each case is a law to itself, there are naturally many forms of operations devised, consequently, I shall take up the principal deformities in presenting cases very briefly, and describe the method of operating, incidentally mentioning other methods.

*Case I.* Miss W., 30 years old, had lues when 20 years of age, which was not diagnosed and treated for four years. Finally there was complete loss of the nasal septum, all turbinates on both sides, and some of the lateral wall of the nose. There was a large perforation of the hard and soft palate about the size of a dollar. The uvula was lost by an ulcerative process. The external soft parts of the nose, including most of the cartilaginous alae, were destroyed and replaced by a tightly drawn scar, leaving a small single opening in the place of the nostrils. Patient had a very thorough antispecific treatment, and was generally absolutely well.

With the above history she was referred to me by Dr. Brophy. Examination revealed a healthy looking mucous membrane of the nose (examined through perforation) and throat.



Fig. 17.

Fig. 18.

Demonstration of the Indian Method.



Fig. 19.

Fig. 20.

Italian Method.

Fig. X shows her appearance at this time. The first procedure was to resect the scar and find the small remains of the cartilages of the alae. Then a columna was made out of the upper lip. I then made two flaps, one from each cheek (German or French method) suturing these different parts together, so as to make a fairly good looking nose at the time of operation, and expecting to place within the nose some mechanical support, instead of the septum, attached to a dental rubber plate, which the patient was wearing to phonate properly, when healing took place. In the



Fig. 21.

meantime, two small rubber tubes were inserted, one in each nostril, and a gauze pack to support this new formed nose. The healing was prompt and the contrivance attached to the rubber plate was introduced on the tenth day. All looked fairly well for about a month, when the flaps began to shrink, and very soon the nose looked about the same as before the operation. About three months later I used the right arm (Italian method) to obtain a large flap. The arm was thoroughly prepared and a large flap (making allowance for retraction) was made; the above retracted skin of the nose was resected and made good, substantial, freshened surfaces. We then approximated the arm and sutured most of the flap. Bringing the forearm over the head, we fixed it by

means of a plaster cast so as to immobilize the whole arm. This operation was done in the summer months, and the patient suffered a great deal of inconvenience. Only a portion of the flap remained united, and made it impossible for me to complete the operation when the arm was released. In the fall of the same year I used the left arm in the same manner with very poor results. In the winter of that year I decided to use a flap (Indian method) from the forehead. This was implanted into a previously prepared defect. It healed by primary union. On the tenth day the stitches were removed, the pedicle cut loose, and properly implanted. The defect caused by the excision on the forehead was brought together and it, too, healed by primary union, although considerable tension was necessary to approximate the edges. It further required about half a dozen small operations, for instance, making a new columna bringing the alae out, so as to make good-sized nostrils. We injected paraffin below the flap to give it consistence for a tip of the nose. The end result is shown in Fig. XXI.

*Case II.* Mrs. E., aged 43. Has practically the same history of lues which was not diagnosed and treated for several years. The end result was complete destruction of the soft palate. The whole external nose was destroyed—that is, the cartilaginous portions, and the upper lip has multiple scars which radiate to the cheeks. Fig. IX shows the patient at her presentation. This woman was absolutely dependent on her own resources and had to work. She was a fine seamstress, but could not get employment owing to her appearance. She preferred not to be operated on, if it was possible to correct the deformity without operation. Considering the situation, the fact that her general health was not very good, and the multiple hard scars that were present, I decided to use an artificial nose, (Fig. XXII), which was very satisfactory to the patient. Fig. XXIII shows the patient after the appliance is properly adjusted. This artificial nose was made by Hofman of Chicago, of flesh-colored celluloid, held by a celluloid spring and the nose-piece of her spectacles. Unless one looks at her very closely, it is not possible to discover this prosthesis, and some advise the use of actor's paste to do away with the junction of the nose with the cheek. I believe in similar cases this method of correction is preferable.

*Case III.* Miss M., 13 years old. Congenital lues, with marked destruction of the septum and lateral wall of the nose. End result a very marked saddle nose with the skin from the bridge of



Fig. 22.



Fig. 23.

the nose folding over the inner canthus of the eyes and causing trouble with the tear duct. (Fig. VIII.)

That it was not the nasal canal that was causing the epiphora was later proven by the cure, which was accomplished by injecting paraffin. The method of procedure in correcting saddle noses or notches by means of paraffin is so well known that I do not think it is necessary to go into details. Hard paraffin is used, injected in semi-solid form by means of the author's syringe. (Fig. XXIV.) The entire saddle-shaped deformity is filled out at once and rapidly formed into a suitable bridge. Ice is applied immediately over the injected area. Secondary correction by reinjection is sometimes necessary. Too great a quantity may be in-

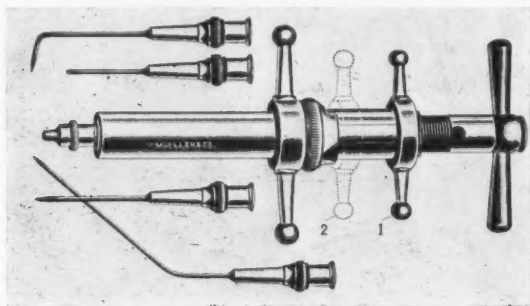


Fig 24.

jected, thereby causing a worse deformity than before, or if one is not careful, it may be injected and allowed to spread in a wrong direction. Again, from too great a quantity necrosis of the skin may result. Infection, hematoma, hemorrhage and embolism belong to the rarest complications. Injections in series of several sittings are followed by a lumpy correction. By observing the proper technic laid down, namely, perfect asepsis, perfect instrumentation, assistant to prevent spreading in a wrong direction by compressing the skin at the side and upper limit of the bridge of the nose against the underlying bone, avoiding the entrance of the needle into a large artery or vein, usually injecting near the middle line, and inserting the needle separately from the syringe, if no bleeding occurs through the needle, the complications of hematoma, hemorrhage and embolism will be avoided.

Good judgment is the only criterion against injecting too much paraffin, and if one should do so rather than through a small in-

cision, one can remove parts of paraffin for some time after operation without any evidence of scars. A mistake made sometimes is to inject the paraffin into the skin proper, rather than below it, which invariably is followed by death of the epidermis. If one wishes to inject in series, then he had better use the method devised by Onodi and others, using semi-solid paraffin that can be moulded. Some interest has been awakened as to the termination of the paraffin, and many experiments have been carried out to determine the same. Kirchner states that soft paraffins are absorbed, but hard paraffins are not. It is stated that new connective tissue forms as a meshwork within the substance of the paraffin. Histological examination makes the bolus appear like a tumor, some say resembling a sarcoma, and it is spoken of as a paraffinoma. The result after the procedure just described above in the present case is shown in Fig. XXV.

*Case IV.* A young girl, 7 years of age, with a marked ulcerative process of the entire external nose, including the bony framework, eyelids, parts of cheek and upper lip. (Fig. XVI.) The pathological diagnosis was tuberculosis and syphilis. No local or general treatment had any effect whatever. So far as the other parts of the ulcerative areas were concerned, not included in the nose, they were covered by skin grafts and neighboring flaps, and the nose was left to the last. Several methods were used, as described in Case I., including the use of the finger. This method is as follows: Take the middle finger of the left hand, remove the nail and matrix, make an incision into the skin and underlying connective tissue in the middle line along the entire palmar surface, beginning at the tip and carrying it to the phalango-metacarpal joint, dissecting these flaps laterally. Freshen the point of the finger by exposing the bone proper and make a slanting surface which fits later into the region of the root of the nose. We next prepare the nasal field, as mentioned above, also freshen the surfaces along the nasal processes of the superior maxilla. The tip of the finger is then placed into the root of the nose, and there held by suturing first the periosteum, and then the skin to these structures of the forehead. Then the skin flaps are united to the surfaces of the nasal processes of the superior maxilla. The arm is then supported and fixed to the head by a plaster cast. This precise procedure was carried out in this case. After about ten days, during which time the field of operation was daily examined and dressed without the slightest manipulation, it was found

united and in good condition. The next step in the operation was to disjoin the finger at the phalango-metacarpal joint, and so shape the finger at this point as to form a good tip of the nose. It was necessary to trim off some bone in order to make nostrils.

This end of the finger is placed into a previously freshened premaxillary area, and there fastened with a wire suture. The remaining skin of the finger is used to best advantage to cover raw surfaces and the formation of alae and nostrils.



Fig. 8.



Fig. 25.

This method was also followed by failure, and finally the last attempt was made, which proved to be successful, namely, the Indian method was used in making a flap from the forehead. The case required a great deal of attention and labor. It was practically two years of dressing and treatment, but the result was satisfactory.

I would like to mention one fact in this case, and that is, that this child was kept by its own people in the barn away from the rest of the family. It was the child of ignorant parents who believed themselves cursed, and did not want the neighbors to know anything about its existence. A country physician discovered the case and sent it to Chicago for treatment.



Permit me to mention a similar method used, but which is only applicable when the nose has skin covering it. In those cases the skin is removed from the dorsal surface of finger, the latter is then pushed into the nose, and its tip fastened into the root of the nose. In this way the finger is used as a septum. The palmar skin covered surface acts as though it was covered with mucous membrane of the interior of the nose. (J. M. Finney.)

*Case V.* Markedly twisted nose to the right, with the anterior triangular cartilage protruding out of the right nostril. Patient



Fig. 16.



Fig. 26.

complained but little of this nasal obstruction, although he could not breathe freely through either nostril. What he wanted was a straight nose. I informed him that I would remove the obstruction, which would very likely correct most of the deformity, and he readily acceded to the proposition. I resected the anterior dislocated cartilage on the right side, and did a submucous operation from the left, leaving a layer of cartilage at the frenum. I had a most excellent physiological and cosmetic result, as Fig. XXVII shows (casts). Refused publication of photograph.

*Case VI.* Miss F., 20 years old. Has a very broad bridge of nose, and a markedly deviated septum. While a small child, sitting on a high chair her father, while intoxicated, pushed her head

against the edge of the table, fractured and pushed her nasal bones inward. (Fig. VII.) Operation. I made an incision within the alae on each side, so as to reach the free border of the nasal bones, then bluntly dissected below the skin as far as the root of the nose. Next I introduced a pair of Adams' modified osteoclastic forceps and broke the nasal bone union in the middle line in such a way as to form a sharp edge over the bridge. Then I drilled a hole externally through the nasal bones and passed a 3-inch silver peg. I covered the bridge of the nose with a layer of gauze, so as to avoid pressure necrosis from the now applied silver wire in the shape of a figure eight loop from one protruding point

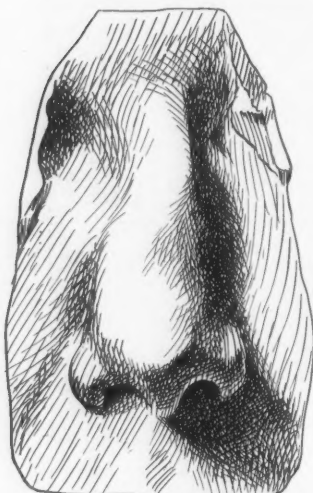


Fig. 27. Cast Before Operation.



Fig. 27. Cast After Operation.

of the peg to the other. This peg and wire procedure prevents the collapse of the nose. In addition, two Frankel's semi-solid splints were introduced along the side of the septum to support the nasal bones from within. Small drainage silk worm strands are introduced into the alar incisions. The case made an uneventful recovery, with the exception of considerable reaction which, however, cleared up. The pegs were removed on the fifth day, and the openings were the only points of infection. Fig. XXVIII. shows you the final result. (Patient refused to have picture taken.)

Other methods for correcting such a deformity in vogue are to make a longitudinal incision along the bridge of the nose, incising the periosteum and peeling back. Then over a properly prepared anterior tibial surface an incision is made, and the sharp edge of the anterior border of the tibia is chiseled off and shaped; the periosteum is to remain attached to the bone splinter to insure its life. The nasal bones are then scraped, or a bur may be used and the bone splinter introduced. The nasal periosteum is then drawn well over it and sutured with catgut. The skin is then sutured carefully, using various methods. The Halstead subdermal suture makes a good one, as there are no stitch holes possible. Dr. Carl Beck of Chicago suggests making a skin graft flap before incising



Fig. 28.



Fig. 7.

the skin, which, when the operation is completed, serves to cover up the cut.

Another method is to introduce foreign substances, like aluminum, silver, platinum, and gold plates, but all these methods are losing favor. Of course, paraffin injections are very serviceable in these cases.

*Case VII.* Mr. H. Large hump nose. Operation was done purely to correct the deformity for cosmetic purposes. His deformity caused his hypersensitiveness to grow to a degree of melancholia. He shunned society—in fact, he did not feel like going to work. He is a salesman by occupation.

**Operation.** A transverse semilunar incision, with the convexity upwards, was made, beginning at the nasal process of the superior maxilla on one side, and carried to a corresponding point on the opposite side. The skin and periosteum were peeled down as far as possible to the lower limit of the hump. By means of Killian's wedge-shaped chisel the hump was removed, great care being taken not to open through the mucous membrane into the nasal cavity. In spite of care, it occurred in two places. The periosteum was drawn over and sutured carefully, as was the skin. Patient made



Fig. 29.



Fig. 30.

an uneventful recovery. No drainage was used. An attempt was made to bring the bones together after the hump was excised, but it was impossible.

The incision is, at times, made longitudinally along the ridge, with equally good results. Of course the incision I made is practically hidden by the nose piece of the spectacles. Intranasal methods are at times used to correct this deformity.

**Case VIII.** Miss I. Congenital absence of premaxillary bony ridge, with the characteristic flat tip of nose. (Fig. IV.) Purely for cosmetic purposes, the patient presented herself for operation.

**Operation.** An intranasal incision was made at the floor of the nose, beginning at the entrance of the nose, and carried about

one and one-half inches backward. Blunt dissection was made of the muco-perichondrium and osteum, chiseled off a spiculum of bone from the floor of the nose; made a pocket below the columna loosening its attachment to the premaxilla, turned this bone spiculum into this pocket; brought back the muco-perichondrial flaps, and held them with packing. On the third day I removed the packing. Healing took place, and considerable improvement fol-



Fig. 31.

lowed. Fig. XXXI. shows the condition after operation, and some subsequent paraffin injection.

*Case IX.* Mrs. X., colored; about 45 years ago she had some trouble in her nose, which was followed by a caving in of the whole tip, especially the left side, and finally it grew fast in that shape. There is no history of syphilis obtainable, and the woman has three healthy children. Examination reveals a complete destruction of the cartilaginous and bony septum, but the nasal bones and lateral margins of the bony nasal framework are intact. The cartilaginous alae are preserved, however drawn inwards, especially the left side, and firmly held, with the skin of the tip of the nose which is intact, to the floor of the nose. The nasal frenum or columna is also preserved. Fig. XI shows the condition as above described.

## OPERATION.

Under general anesthesia by the spray-vapor method. I mention this especially because it was the most satisfactory narcosis I had ever given for a similar operation. The following steps were performed: Packed nose. Severed the adhesions of the drawn-in nose to the floor, thoroughly severing all attachments to the lateral margins of the bony framework, as well as the free borders of the nasal bones, as far up as the root of the nose. All these procedures were made within the nose, no incision being made externally. This permitted drawing out the whole tip prominently. I now scraped very thoroughly the nasal bones, just below the skin, and also the floor of the nose right behind the columna. This was done in order to obtain fresh bone surfaces for the implanted bone septum. Packing the nose, I next made an incision over the previously prepared anterior border of the right tibia for about four inches up to the periosteum. A two and one-half inch piece of bone was now excised with the periosteum attached, using the sharp ridge of the tibia as the future nasal septum. The shape of this splinter was triangular, with the base downward, to be implanted at the floor of the nose and the apex on top of the nasal bone. The periosteum of this splinter was now in contact with the subcutaneous connective tissue of the bridge of the nose. A suture was now passed through the periosteum of the splinter, right back of the column of the nasi, and allowed to come out below each nostril through the upper lip, and close to the frenum, a pad of gauze was placed externally over the frenum and the suture tied. This was done to hold the splinter in position to give prominence to the tip of the nose, the gauze packing is now completely removed, and two large Asch tubes are introduced, these being held from falling back into the nasal cavity by two threads fastened by adhesive plaster to the cheeks. No dressing was applied. The patient recovered from the operation, and Fig. XXXII shows her after operation.

*Case X.* Mr. S., (Fig. XIV.), mild form of pound nose, acne rosacea. There is a general overgrowth of the soft parts of the external nose. A number of studded areas are present, with a central breaking down. The skin is generally eczematous and deeply red. Distinct large venules are to be seen everywhere over the nose. This process extends to the forehead and side of cheeks, The man is not a marked drinker, and the withholding of liquor has had no effect on it. The treatment in this case is very satisfactory by means of the high frequency currents and electrolysis. Af-

ter a few sittings the nose became paler and smaller, as shown in Fig. XXXIII.

Other methods of treatment in these cases have been to use electrolysis, electric needle punctures (galvanic current), electrocautery, severing the small blood vessels surgically, multiple incision, and the operation of decortication and skin grafting. This last procedure is only warranted in very marked cases. It simply means to remove all the pathological tissues and cover with skin graft.



Fig. 32.

*Case XI.* Baby M.,  $1\frac{1}{2}$  years old. Had an operation for hare-lip shortly after birth. The result was very satisfactory, but the nostril was not perfect. Its greater diameter was transversely rather than antero-posteriorly.

*Operation.* This consisted in freeing the ala from the cheek and drawing it closer to the columna, so as to conform to the shape of the opposite nostril. Then the cheek was slightly loosened from its attachment at the fossa pyriforma and drawn over to the new fixed alae in its new position and sutured. Healing by primary union occurred, and the result was good. A small Asch tube was worn in the nose for a few weeks, three hours daily, in order to obtain and preserve the proper shape of nostril. In double-sided

hare-lips a similar procedure may be necessary. No photograph obtainable.

*Cases XII and XIII.* Both these cases have practically the same form of deformity, and the same method of procedure was used, so I will consider them together.

Mr. W., medical student, has been suffering from chronic nasal obstruction, which was due to a markedly deflected septum. This was operated upon by the submucous method. An unusual and disagreeable complication resulted, namely, a constant bleeding.



Fig. 33.

Patient was sent to a hospital, where inexperienced men in this line of work attempted to control this bleeding, the patient's own physician (a specialist) being out of the city at the time. According to the statement of the student, the internes used all sorts of remedies by spray, swab and pack, as  $H_2O_2$ , adrenalin, ichthyol and iron, without controlling the bleeding. I saw the patient one week after operation, and there was still bleeding from within the flaps. The operation was perfect, but the flaps were not coapted, and a big hematoma was situated between them. I removed this, coapted the flaps, and kept in this position by firm packing in both nostrils. Hemorrhage ceased, and on the third day the packing was removed. There was no more bleeding, but after that the nose was stuffy for some time, but finally cleared up and good breathing



space was obtained. Six weeks later the patient came back with a sunken-in nose, as shown in Fig. II, the notched nose. This notch is situated just below the free border of the nasal bone, and more on the left than on the right side.

Operation consisted in injecting a small amount of hard paraffin, subcutaneously, to fill out the notch, with a good result.

M. H., 7 years old, received a blow from another boy on his nose, and his nose swelled inside, so that he could not breathe through it for about a week. Then his mother noticed a discharge from his nose, and he was well again.

Three weeks later she noticed suddenly a notch in his nose, between the tip and the hard portion.

The diagnosis was probable abscess of the septum, following traumatic chondritis. There was secondary wasting of the cartilage, with contraction of the cicatricial tissue, and sinking in of the septum. Hard paraffin was injected with satisfactory results.

So far as the numerous external nasal deformities, such as moles, blemishes, wrinkles, scars, and the various insignificant and often imaginary troubles are concerned, I have nothing to say at present, because I have already expressed myself in the first part of my paper. Tumors and other pathological conditions not mentioned in the article will be dealt with by the usual surgical principles and cosmetic surgery.

As to the literature on the subject, it is very exhaustive, and to repeat it would add little value to this article. But I want to mention and to present here a little original book of Tribhovandas Motichaud Shah L. M., assistant surgeon and chief medical officer of Junagadh, presented to Dr. Carl Beck. In it are detailed descriptions of 100 rhino-plastic operations performed by himself. Two principal methods were used, namely, flaps from cheeks and forehead were used. The latter gave the best results.

A more modern reference is the one of Dr. John D. Roberts, entitled "Deformities of the Face, with Special Reference to Nasal Plastics." Some of his methods are very unique and appear to have given him good results.

Such men as Tagliacozzi, Langenbeck, Ollier, Senn, Keegan, Roe, Bunker, Dieffenbach, Fraefe, Blaudin, Serre, Jobert, Zeis, Warren, Mutter, Pancoast, Post, Buck, Andrews, Prince, Seymanowski, Reverdin, Krause, Thiersch, Wolfe, Joseph von Eiselsberg, J. B. Murphy and Carl Beck, Chicago, must be recognized as great workers in this line of plastic surgery.

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## THE CORRECTION OF NASAL DEFORMITIES.\*

BY JOHN O. ROE, M. D., ROCHESTER, N. Y.

In compliance with the request to take part in this discussion on "The Correction of Nasal Deformities," I shall confine my remarks to a brief discussion of the subcutaneous method, which does not involve injuries to the skin, except in those cases where it is necessary to remove unsightly scars that would remain a pronounced blemish to a nose, however comely in size, shape and general conformation it might otherwise be.

There is no class of operations that demand in every case a more careful preliminary study of all the conditions presented—not only in respect to the abnormal state of the tissues to be operated upon, but also in respect to the possibility of obtaining the desired surgical result—than those operations required for the correction of nasal deformities.

In studying the etiology of nasal deformities it must be borne in mind that such an abnormal condition may be due to a great variety of causes. It may be due to an abnormal development of the nose, an overgrowth amounting in some cases to an elephantiasis; or it may be due to an unequal growth of the two sides of the nose, or of the two sides of the laminae of the septum, distorting both the septum and the nose. The distortion may be the result of an extra or intra-nasal neoplasm, or, as is frequently the case, of a traumatism with a definite history, or presenting a pronounced mark of the injury. It may be of constitutional origin with a leutic history, presenting the definite specific manifestation shown in the excavated, shrunken and caved-in nose that results from the destruction of the bony or cartilaginous framework, or perhaps of both, and sometimes shown in the dactylitic condition occasionally seen. The deformity may be the result of lupus that has been arrested, leaving scars and deformities, which must be carefully differentiated from leutic manifestations. The abnormal condition also may be of a tuberculous nature, associated with similar manifestations in other parts of the body, or finally, it may be caused by ulceration or by a growth of a malignant nature.

\*Symposium paper presented at the 14th Annual Meeting of the American Laryngological, Rhinological and Otological Society at Pittsburg, May 29, 1908.

Having ascertained the etiology of the deformity, we can then intelligently examine the nose to determine the exact nature of the deformity, the condition of the tissues and the anatomical structures, both external and internal, that are affected by or that enter into the deformity.

After this careful study of the cause and nature of the deformity it is necessary to consider the possibility of obtaining the result desired in its correction and to advise intelligently as to the desirability of the operation and the probability of its being a success. It may be said on general principles that the correction of a deformed nose, in which so much is involved to both the patient and the surgeon, may be likened to matrimony, which "should not be entered into unadvisedly or lightly, but reverently, discreetly and advisedly."

In all cases in which the deformity of the nose is associated with or caused by a constitutional condition, such as lues, no attempt to correct the deformity should be made until the constitutional condition has been most thoroughly treated and all manifestations entirely removed.

Without this precaution being taken the operation would be quite sure to be a failure, the disease would be excited to a greater local activity, the healing of the wound prevented, thereby resulting in greater destruction of tissue from abscess or ulceration and an increase in the deformity. When the constitutional disease has been completely arrested and all local manifestations quiescent for a considerable time (for say six months) in most of such cases little or no difference from non-specific cases will be seen in the healing of the wound, if the blood supply has not been cut off by cicatricial tissue, and if care is exercised during the operation to interfere with it as little as possible. These specific cases, however, at best must be regarded as an uncertain quantity, and will sometimes disappoint us or "go bad" when least expected.

If the deformity of the nose is found to be associated with a local disturbance inside the nose, obstructing the passages, we should invariably remove or correct this local condition, whether it be a deviation or thickening of the septum, enlargement of the turbinates, a polypoid or other growths, or even adenoids and large tonsils.

To preserve perfect nasal respiration is of the utmost necessity, not only to the health and comfort of the patient, but to the satisfactory correction of the nasal deformity.

Having determined on the advisability of the operation, the operation itself must now be carefully studied as related to the condition and position of the tissues, the relation of the different parts of the nose to one another, and the relation of the shape of the nose to that of the face.

In studying the normal nose of different types of faces we find that the noses of people having broad or eurygnathous faces with prominent malar processes and orthognathous jaws tend toward the Grecian in outline; and as this type becomes more accentuated the nose becomes more flattened in the center and thickened at the end, with more expanding wings; when, however, the shape of the jaws merges into the prognathous type, the nose becomes Roman in form.



Figure 1.



Figure 2.

People with narrow faces, small malar processes and orthognathous jaws have narrow, thin and aquiline noses, the aquilineity increasing as the jaws incline toward the prognathous.

The narrow face, undeveloped and retrousse nose, prognathous upper jaw and projecting incisor teeth are most distinctly the mark of an interference with or a distortion of development due to mouth breathing in infancy and childhood so often caused by enlarged tonsils and adenoids and other naso-pharyngeal obstructions.

In correcting a nasal deformity and reconstructing a nose careful attention must therefore be paid to these various conditions.

While symmetrical relations of the different portions of the nose to one another are of the greatest importance, the symmetrical relation as to the size and shape of the nose to the general contour

of the face must also be carefully considered, in order to approach the ideal from an artistic standpoint. If we superimpose an aquiline nose on a broad face with pronounced malar processes we have an incongruity quite as pronounced as putting a small Grecian nose with a low bridge on a narrowly constructed face, as is shown in three or four of the illustrations. The aquiline nose in figure 16, which is very becoming to the young man with a narrow face, would ill become the broad face of the patient in figure 12 or 18; and the comparatively small Grecian nose in figure 12 or 18 would very seriously detract from the character of the face in figure 16.

A complete description of the technique is scarcely possible, for the reason that in no two cases are the same conditions present re-



Figure 3.



Figure 4.

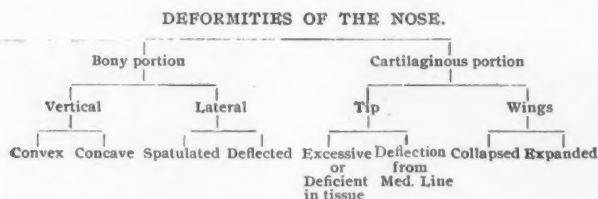
quiring the same procedure. Roberts, in his lectures on "The Surgical Treatment of Disfigurements and Deformities of the Face," very truly says:

"It is difficult to give definite directions for geioplastic procedures, because the surgeon must be governed by the peculiarities of the case under observation. Almost every time one operates the method must be varied to meet the requirements. Often, indeed, the necessities of the case determine the line of incision only after the operation has been commenced."

This is equally true of subcutaneous plastic work. On general principles it may be said that the first step in the operation is to carefully raise the skin without injuring it from the deformed portion, the incision being made from the inside of the nostril anterior to the deformity, and the redundant portion cut away or placed in

the depressed portion, so as to make the nose symmetrical and give it the shape we desire. Except in very large noses, as in figure 1, it is rarely necessary or desirable to remove any portion of tissue or even bone, for there is generally a correspondingly depressed portion that requires filling up to give the nose the proper shape. This is particularly the case where the cause of the deformity is traumatic, when we simply have a displacement rather than a destruction of tissue, which should be restored, so far as possible, to its former position.

In 1898, in an article on this subject, which I read before the British Medical Association, I classified nasal deformities as follows:



I here reproduce this classification for reference, as it is the one I use, and the one followed in the report of the following cases that I have selected to illustrate the different points of the technique of the subcutaneous method.

*Case 1.* Convex vertical deformity of the bony portion of the nose. Mr. J., aged 23, injured his nose six years before in a fistic encounter, which caused an exostosis of the nasal bones. The end of the nose was abnormally long, due to an elongation downward of the triangular cartilage, shown in figure 1. On examination there was found also a deviation of the osseo-cartilaginous portion of the septum to the right, obstructing this nostril, the left nostril being greatly narrowed by a marked projecting of the nasal process of the superior maxilla.

The first thing done was the straightening of the septum and the removal of sufficient of the nasal process of the superior maxilla to render the nasal passages entirely free. The exostosis of the nasal bones was then removed by carefully sawing them off on a line, so as to leave the dorsum of the nose straight, having first elevated the skin from this region through an incision on the inside of the alae. As there was no depression to be filled in, the portions that were sawed off were removed. When completely

healed, the elongation of the lower end of the triangular cartilage was resected and the ends strapped back in place, which when healed gave the most excellent result shown in figure 2.

*Case 2.* A similar convex vertical deformity. Mrs. G., aged 40, injured her nose three years ago last July by falling from her bicycle. The front wheel stuck in a rut and threw her over the handle bar, her nose striking a stone. When the swelling had subsided she experienced much difficulty in breathing through the nose. One year later this obstruction, in the form of a bone, was removed, evidently a portion of the deviated septum, which resulted in the sinking-in of the dorsum of the nose. Six months after this a friend of mine in another city, who believes in the efficacy of wax, filled this depression, or rather, overfilled it, with



Figure 5.



Figure 6.

paraffine, with the result as shown in figure 3. In addition to this marked bulging of the dorsum there was a pronounced redness, which still further disfigured her nose.

In the correction of this deformity several operations were required. First, the tissue containing the paraffine was removed sufficient to bring the dorsum of the nose down nearly to a straight line. This was done subcutaneously through an incision on the inside of the ala. When this had healed, three weeks later, the distorted end was put in shape by raising the skin and filling in the depressed portions with flaps from the elevated portions. The tissues healed tardily where the paraffine had been injected, and later developed a tendency to swell when the external pressure from the dressing was removed, and after a time it became so enlarged

that it was found necessary to remove some of this tissue to compel the nose to heal in the desired shape, as shown in figure 4.

*Case 3.* A concave vertical deformity of the bony portion of the nose, the result of an injury. Miss M., aged 25, fell from the second story window upon a piazza railing, when five years old. She was at the time leaning out of the window and fell head foremost, striking on her nose. The nose at the time became much swollen, but as no physician was at hand she was attended by a nurse, and no attempt was made to replace the fractured fragments of the nasal bones. When the swelling subsided the bridge of the nose was found to be very flat, almost on a line with the face, but as it was thought nothing could be done to relieve the disfigurement no further attention was given to it.\* Figure 5 rep-



Figure 7.



Figure 8.

resents the condition of the nose at the time I saw her, February 22, 1906.

On examination the nasal bones were found displaced outward and downward, leaving two well marked ridges on either side. The end of the nose was abnormally enlarged and the wings expanded. The nasal passages were very much obstructed by ridges and thickening of the septum, that resulted from the impaction of the perpendicular plate of the ethmoid, and by marked turbinated hypertrophy on both sides.

Before correcting the deformity of the nose it was necessary to render the nasal passages free by a reduction of the turbinates in the usual way, and the submucous resection of the septal excrescences. The external deformity was then corrected by elevating the skin from the depressed portion through an incision made



from the inside along the upper border of the lower lateral shield cartilages. When this was done the periosteum was raised about ten millimeters outside of the displaced nasal bones. Projecting portions of the nasal bones were then sawed off and put in the medial line, together with the periosteum that had been elevated from the bone just outside of them. These were carefully held in place by an external dressing, so as to maintain them in this position until union had taken place. After the parts had thoroughly healed, the remaining depression below was filled in with the redundant tissue in the end of the nose, which was carefully cut into a flap and turned into the depression. This was also held in place by an external dressing until thoroughly healed, which left the nose in the condition shown in figure 6.



Figure 9.



Figure 10.

*Case 4.* This is an exceedingly interesting case, involving both a serious concave vertical deformity and also a deflection of the bony portion of the nose. The deformity, as shown in figures 7 and 8, had resulted from being thrown from a carriage by the breaking of the forward axle, and in the fall striking the nose upon the sharp edge of a tramway rail, causing a most frightful injury to the face, the loss of the sight of the right eye, together with a concussion of the brain, which was so severe that life was despaired of for several days after the accident. The injury to the nose completely severed the lower portion of both nasal bones, flattening the lower depressed portion completely to a level with the face, leaving the stump of the nasal bones projecting above like a ledge, as shown very clearly in figure 7, and the fearful scarring that resulted when the wounds healed is shown very well in figure

8. The septum was also so distorted to the left as to completely occlude the left nostril, and the knocking inward of the center of the nose had caused the end of the nose to be tilted upward and to the right, as is also shown in figure 8. As the patient formerly had quite a large nose, the end therefore appeared by comparison with the remaining portion abnormally large.

Several operations and much careful attention were required in the correction of this deformity. The first one consisted in the raising of the skin from the central portion of the deformed part through an incision from the inside of the ala, which, owing to the firm attachment of the skin in many places to the parts below, at the site of the scars, proved to be a very difficult procedure. When this was done, a portion of the projecting nasal bones was sawed



Figure 11.



Figure 12.

off through this incision with a nasal saw and placed in the depression below. In order to be certain of the bone's uniting quite firm pressure by the external dressing was necessary in order to keep the parts in firm coaptation. When the parts had healed from this operation, after about three weeks, the skin was raised from the lower end of the nose and also from the dorsum of the depressed portion in the center, and a flap made from the tissue in the end of the nose and turned into the portion still depressed, which elevated the center of the nose still farther. When this had healed a flap was turned in from the ridge of the tissue on the left side of the nose, and likewise from the right side, and in this manner the nose was built up until we had the symmetrical result shown in figures 9 and 10.

The result in this case was highly gratifying, but required much patience, both on the part of the patient and the operator. The only disfigurement then remaining was the right eye, which was lost at the time of the accident. This, however, was rectified by the insertion of a glass eye by his oculist at his home, who had referred the patient to me.

*Case 5.* A. S., aged 34, a resident of Helsingfors, Finland, was kicked in the face by a horse when a year and a half old, fracturing the nasal bones and driving them inward. On examination the nose showed a concave vertical deformity of the bony portion of the nose, with a scar on the left side of the nose over the nasal bone, which drew the left ala up considerably above the other. The septum was irregular, with a large enchondroma on the left side.



Figure 13.



Figure 14.

In correcting this deformity the interior of the nose was first put in order, and the enchondroma removed by a submucous resection. The external deformity was corrected by carefully raising the skin from the dorsum of the nose through an incision just inside the ala, near the tip of the nose. The skin in this case was firmly attached to the nasal bones at the seat of the injury, but by thus freely liberating it the left ala was brought down on a line with the right ala. A flap was then made of the redundant cartilage at the end of the nose and turned up into the depressed portion between the eyes. The triangular cartilage just above the tip of the nose was then sufficiently liberated by a beveled incision from above downward, so that the end of the nose could be brought down, making the lower end of the nose almost horizontal. The nose was then held in place by a metallic splint,

formed to the desired shape of the nose, which was held in place until union of all the parts had taken place. The nose was then comparatively satisfactory, excepting two or three minor defects, that required slight operations, and when these were healed the nose was left in a highly satisfactory condition. Figures 11 and 12 show the nose before, and figures 13 and 14 after the operations.

*Case 6.* A young man, aged 28. There was in this case deficiency in tissue of the cartilaginous portion and a lateral deflection to the right of the bony portion, as shown in figure 15. There was also a marked expansion of the alae on both sides. The deformity had resulted from a fall when a child, before he could remember. On examination of the interior of the nose the septum was found slightly deviated to the right, with a knuckle of car-



Figure 15.

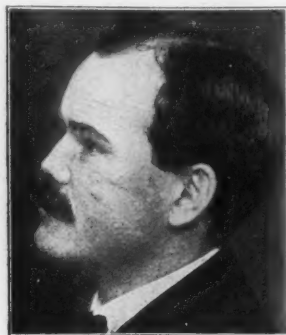


Figure 16.

tilage obstructing the right nostril. The left passage was much obstructed by a large posterior inferior turbinate hypertrophy. The operation for correcting this deformity was quite similar to the previous cases: the skin was raised from the deformed part, the marked thickening on the left side of the nose above was sawed off, and the portion removed placed in the depression below. The deformity of the lower third of the nose was corrected by taking off the elevated portion and turning it in by a flap operation into the depressed part. When this had healed the dorsum of the nose was quite straight and symmetrical, but the alae were still abnormally spread out, owing to an unusually wide attachment. This condition was rectified by severing the lower attachments of the cartilages subcutaneously with a slender knife, similar to a tenotomy knife. When this was done the attachments of the alae were

carried inward and stitched in the position desired by means of the writer's intra-nasal suture needles, horsehair being employed for the suture, and when healed the nose was left in the condition shown in figure 16.

*Case 7.* W. H., aged 40. This case represents a condition we often find resulting from traumatism, combining two or three different deformities in one nose. In this instance we have a depression of the upper cartilaginous portion of the nose, and a convex vertical deformity and lateral deflection of the bony portion, as shown in figure 17,—the result of an injury from a fistic encounter with some boys when ten years old. He has had since the injury much difficulty in breathing through the nose. On examination the left nasal bone was found displaced to the left,

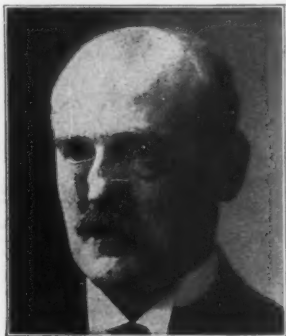


Figure 17.



Figure 18.

together with the upper dorsal cartilage. The triangular cartilage was excessively thickened, which had resulted from the crushing of the dorsum at the time of the injury. The tip of the nose also was much enlarged.

In correcting this deformity it was necessary first to reduce the thickening of the septum by resecting a portion of it by the sub-mucous method, so as to render the nasal passages free. The external deformity was corrected by first elevating the skin from the deformed part, and turning up a portion of the redundant tissue in the end of the nose by a flap-operation into the cartilaginous depression. A portion was then removed from the projecting nasal bone, and also placed in the depression below. The nose was then dressed with a supporting splint on the outside in the form of a saddle, and held in place until healed. Two minor op-

erations were required to level some slight irregularities that remained, when the nose was left in the condition shown in figure 18.

*Case 8.* Concave vertical deformity of the bony portion of the nose and a marked thickening of the cartilaginous portion. Miss Y., aged 21. When six years of age, while ill with an attack of tonsillitis, she attempted to go down stairs, but was so weak that she fainted and fell the whole length of the stairs, striking on her nose. The nose became very much swollen and infected with erysipelas, which extended over her whole face. At the end of two weeks the erysipelas had subsided, leaving the nose almost completely flattened in the center.

At the time I saw her the nasal bones were flattened and dislocated outward. The sesamoid and upper shield cartilages in the



Figure 19.



Figure 20.

dorsum of the nose had been destroyed, while the tip of the nose and alae were large and very much expanded, as shown in figure 19. The operation for the correction of this deformity consisted in dissecting up a portion of this redundant tissue in the end of the nose and turning it back in the form of a flap into the depressed portion. The incision in this case was made just inside the border of the alae, raising the skin from the part that was to be dissected up and also from the depressed portion. When this was done the parts were held in place by a saddle splint on the top of the nose, free drainage being allowed from the inside. When the parts had healed and all the swelling subsided, the nose was not quite perfect, requiring a second operation similar to the first to raise the center to the desired height, and also to depress the tip and make the nose symmetrical, as shown in figure 20.

*Case 9.* Excessive development of the tip of the nose with an enlargement and expansion of the alae, shown in figure 21. Mrs. W., aged 30. In this case there was no history of traumatism. The exuberant growth of the end of the nose had evidently resulted from persistent turgescence caused by intra-nasal pressure and obstructed nasal passages due to marked enlargement of the middle turbinates and anterior ethmoid cells, and also to lower posterior turbinate hypertrophy. Preliminary to the correction of the external deformity, the nasal obstructions were carefully removed, as in the previous cases. The enlarged ethmoid cells were obliterated by submucous resection of the inner bony wall, and the passages were maintained free by careful packing with iodoform gauze until healed. The external deformity was cor-



Figure 21.



Figure 22.

rected by cutting flaps of the redundant tissue at the end of the nose and turning them back along the bridge, after having elevated the skin over this region. When this had healed the inflated and bulging condition of the shield cartilages was reduced by carefully incising the cartilages from the inside and strapping and holding them in place in the desired position. When this was done the nose was found to be too long in proportion with the rest of the face. This was rectified by the removal of a triangular piece of the septal cartilage and suturing the parts back in place, which left the nose when completed as shown in figure 22.

*Case 10.* Congenital enlargement of the entire nose, shown in figure 23. Miss M., aged 23, had had from infancy an unusually large nose. This deformity greatly annoyed her, so much as to be a positive hindrance to her in her dramatic work. The

mode of reducing the size of the nose consisted first, in sawing off a portion of the nasal bones and paring them off, subcutaneously, to lower the nose to the desired dimension. After healing, the skin was carefully raised from the lower portion of the nose and portions of the shield cartilages were resected. The nose was then carefully strapped, so as to hold it in place, in the desired shape and held there until completely healed, leaving the nose as shown in figure 24, which appears as a fine symmetrical nose, being several sizes smaller than before the operation.

In the correction of nasal deformities by the subcutaneous plastic method, quite as much care must be exercised as by the external skin flap method. If too much tissue is taken from any particular part a depression will result; if too much is put in a hump



Figure 23.



Figure 24.

will be left. If the skin is injured an undesirable scar or redness or other disturbance of the skin will result.

Quite as much patience and perseverance is required as by the other method, for subcutaneous wounds are quite as slow to heal as external wounds, and frequently more so, owing to the disturbance in the circulation often required by the quite extensive cutting we are sometimes obliged to do. It is on this account that we often have persistent swelling of the nose on removal of the external dressing for some time after the tissues are apparently healed. In these cases it is absolutely necessary to wear the dressing with sufficient pressure to keep this swelling down until the parts have become so healed that this tendency has completely disappeared.

In some instances patients have become so impatient to be freed from their nasal dressing that I have been induced to remove it pre-



maturely, and later they were rewarded for their impatience by being obliged to have another operation which a little longer wearing of the dressing would have avoided. As I have said before in previous papers on this subject,\* the reward of patience and perseverance, in these cases is the satisfaction of success on the part of the surgeon and a perfect nose on the part of the patient.

44 Clinton Avenue, South.

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\*Amer. Med. Quarterly, June, 1899.—Medical Record, New York, July 1st, 1905.

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**Amaurosis after a Prosthetic Injection of Paraffine for Saddle Nose.** W. MINTZ. *Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, Nov. 25, 1905.

The case was a patient of 25 years, on whom in 1903 an injection of paraffine had been made for correcting this nasal deformity. As the injection had been insufficient for perfect correction, the author repeated the injection and, about 15 millimetres from the point of the nose, first on the right and then in the left side, he injected a small quantity of paraffine at 43 degrees (cent.)

Three minutes after the injection, pain developed in the left eye, which rapidly became blind. There was much vomiting, the following day there developed symptoms of venous stasis, such as disturbance of the cornea, exophthalmos and paralysis of the eye muscles. The skin surrounding the point of the injection became gangrenous.

Evidently there had developed a thrombosis of the external nasal veins, and extending as far as the inferior ophthalmic vein and the central vein of the retina and thence to the principal branches of the ophthalmic vein and the cavernous plexus.

We should therefore recognize the possible dangers of such a prosthetic injection and try to prevent them.

SCHEPPEGRELL.

## THE CORRECTION OF NASAL DEFORMITIES BY THE USE OF PARAFFIN.\*

BY HARMON SMITH, M. D., NEW YORK.

So much adverse criticism has been brought to bear upon the subcutaneous injection of paraffin, and so many dangers have been enumerated as possible sequelae to its use, that I have deemed it wise to investigate by personal inquiry the causes which have occasioned the criticism and the conditions which have contributed to the bad results. To this end I sent out to all those engaged in this work a circular letter requesting information as to the following points:

1. Total number of cases injected for the correction of nasal deformity.
2. Number of successful cases.
3. Number of unsuccessful cases.
4. Attributable cause of non-success.
5. Number of cases of blindness due to embolus.
6. Number of cases of sepsis resulting in abscess and loss of paraffin.
7. Number of cases where paraffin lodged in undesirable location at time of operation.
8. Number of cases where paraffin shifted after operation.
9. Instrument used for injection.
10. Kind of paraffin used and melting point.
11. Methods employed to prevent paraffin entering undesirable localities.
12. Conclusions: Do you consider it dangerous, undesirable, unwarrantable, or practical?

I received ninety-one replies to the letters sent. Of this number forty-one surgeons had made paraffin injections for the correction of nasal deformities in one or more cases; forty had had no experience, and ten had had too little experience to express an opinion. I have not included my own experience in these statistics, but I wish to say that in over two hundred injections for the cor-

\*Symposium paper presented at the 14th Annual Meeting of the American Laryngological, Rhinological and Otological Society at Pittsburg, May 29, 1908.

	Total number of cases injected	Number of successful cases	Number of unsuccessful cases	ATTRIBUTABLE CAUSE OF NON-SUCCESS	Number of cases of blindness	Number of cases of sepsis and loss of paraffin	Number where paraffin lodged in wrong locat'n	Number of cases where paraffin shifted	INSTRUMENT USED FOR INJECTION
1	10	8	2	Scalding and sepsis in one	0	1	0	1	Ordinary glass
2	12	12	0	Too little paraffin	0	0	0	0	H. Smith's
3	7	6	1	Failed to place paraffin in proper place	0	0	1	0	" "
4	10	9	1	Syphilis	0	0	0	0	Ordinary hypodermic
5	5	5	0	"	0	0	0	0	H. Smith's
6	6	6	0	"	0	0	0	0	" "
7	22	22	0	"	0	0	0	0	" " and Plaus
8	2	2	0	"	0	0	0	0	" "
9	3	3	0	"	0	0	0	0	" "
10	25	19	6	Improper instruments at first	0	0	0	0	" "
11	487	212	68	Infection	0	44	18	4	Killian's syringe
12	1	0	1	"	1	0	0	0	Ordinary hypodermic
13	4	3	1	Ulceration	0	0	0	0	Special syringe
14	75	74	1	Excess paraffin, renewed later	0	0	1	0	" " Lun.
15	1	1	0	"	0	0	0	0	First Own—Second Smith's
16	14	11	3	Scar tissue and no support	0	1	0	1	Smith's
17	1	1	0	"	0	0	0	0	Beck's
18	8	8	0	"	0	0	0	0	Smith's
19	15	14	1	Over-injection	0	0	0	0	" "
20	75	70	5	Scar tissue and no septum	0	0	1	0	" Yankauer modified
21	100	98	2	Traumatic scar and fighting	0	1	0	1	Smith's and Ratchet injector
22	1	1	0	"	0	0	0	0	Simple syringe
23	0	5	1	Did not return for second injection	0	0	0	0	" modified
24	6	4	2	Poor technic & failure of 2d injection	0	0	0	0	Plau's syringe
25	15	15	0	"	0	0	0	0	" "
26	5	5	0	"	0	0	0	0	Smith's
27	50	0	0	"	0	0	0	0	" "
28	12	12	0	"	0	0	0	0	Metal
29	15	15	0	"	0	0	0	0	Smith's
30	6	5	1	Too close to syphilitic ulceration	0	0	0	0	Ordinary hypodermic
31	16	16	0	"	0	0	0	0	Smith's
32	12	11	1	Abscess, etc.	1	1	0	0	" "
33	1	1	0	"	0	0	0	0	" "
34	1	0	1	Ulceration	0	1	0	0	" "
35	7	7	0	"	0	0	0	0	" "
36	10	8	2	Syphilis and low vitality	0	1	1	0	" and ordinary
37	3	3	0	"	0	0	0	0	" "
38	3	3	0	"	0	0	0	0	" "
39	7	7	0	"	0	0	0	0	" "
40	3	2	1	Sepsis. Needle too close to skin	0	1	0	0	Broeckhaert's
41	200	199	1	Unhealthy tissues and sepsis	0	1	0	0	Downie's

INSTRUMENT USED FOR INJECTION	KIND OF PARAFFIN AND THE MELTING POINT	Method Employed to Prevent Paraffin from Entering Undesirable Localities	CONCL
ary glass - -	M of 105 to 136 F - -	Digital pressure on nose	Has not felt sufficiently enthusiastic to co
Smith's - -	Smith's formula - -	" " " "	Experience limited. Thinks idea an exce
" - -	" " - -	" " " "	Practical results excellent, Scared by larg
ary hypodermic - -	Paraffin & vaselin temp. 106 F - -	" " " "	Very practical
Smith's - -	Smith's formula - -	" " " "	Practical
" and Pfaus - -	" " - -	Used solid paraffin	Not dangerous if injected at proper tempera
" - -	120 F melting - -	Finger pressure	Practical, but slight element of danger
" - -	Smith's formula - -	2 flat pieces lead on sides	Not without danger, but in selected cases
" - -	" " - -	Finger pressure	Not dangerous when carefully performed.
n's syringe - -	- - - -	" " - -	In select cases practical and safe. First c
ary hypodermic - -	110 F melting point - -	None	In some few cases it is dangerous and un
al syringe - -	108 to 113 F - -	Finger pressure	Dangerous and unwarrantable
" Lun. - -	110 F - -	" " - -	Dangerous, owing to death, and at least
Own—Second Smith's - -	107 F - -	Comp. & loosening tissue	Not dangerous. Practical
s - -	Smith's formula - -	Finger pressure	Not dangerous
s - -	Solid paraffin - -	" " - -	Dangerous. Warrantable in selected case
s - -	Smith's formula - -	" " - -	Practicable and warrantable, if Paraffin is
Yankauer modified - -	" " & 120 to 130 F - -	" " - -	Not dangerous, but warrantable and pract
s and Ratchet injector - -	" " & paraffin 120 F - -	" " - -	Not dangerous, but warrantable and pract
e syringe - -	Hot paraffin - -	" " - -	Practical and warrantable when done on s
modified - -	Smith's 110 F - -	" " - -	Not dangerous but practical and warranta
syringe - -	110 F - -	" " - -	Practical. Suggests mixture of Paraffin a
" - -	Cold - -	" " - -	Danger of starting malignant growth
s - -	Smith's 110 F - -	" " - -	Not dangerous, nor undesirable, nor unp
" - -	103 to 110 F - -	Finger press. & steel bands	Not dangerous, practical
" - -	110 F - -	Finger pressure	Not dangerous if high melting point, and
s - -	110 F - -	" " - -	Not dangerous in small amounts
ary hypodermic - -	White - -	" " - -	Unjustifiable in minor deformities
s - -	Smith's - -	" " - -	Practical in minor deformities
" - -	First liquid; second 110 F - -	" " - -	Practical and desirable
" - -	Smith's formula - -	" " - -	Practical, but dangerous
" - -	Smith's formula - -	" " - -	Practical if properly done, not many cases
and ordinary - -	105 to 110 F - -	Finger press. & small amts.	Of value in selected cases; unwarrantable
" - -	Smith's 110 F - -	Finger pressure	Valuable in limited number of cases, whe
" - -	Smith's 110 F - -	" " - -	Practical if depression is high up; difficu
" - -	Smith's 110 F - -	" " - -	Practical with proper precautions
khcart's - -	First 120 F.; now cold wax - -	" " - -	In skilled and experienced hands consider
ie's - -	108 to 110 F - -	Celloidin & finger press.	Practical. Not dangerous
			Practical
			Great utility in suitable cases if injected

# CONCLUSIONS

## OPERATOR

enthusiastic to continue owing to more important matters  
 idea an excellent one  
 Scared by large No. cases blindness and shifting paraffin  
 proper temperature. Desirable. Warrantable. Practical  
 of danger  
 selected cases warrantable and practical  
 performed. Practical  
 safe. First cases not failures but unsuccessful  
 gerous and undesirable  
 ble  
 , and at least eight cases of Keloid following  
 n selected cases  
 e, if Paraffin is solid and digital compression complete  
 table and practical  
 table and practical  
 when done on selected cases  
 l and warrantable  
 l and warrantable  
 re of Paraffin and Rubber injected cold  
 unt growth  
 rable, nor unpractical, except in Syphilis  
 ing point, and not too much injected  
 ounts  
 rmities  
 ies  
 not many cases suitable  
 unwarrantable in inexperienced hands  
 r of cases, when used with great care  
 gh up; difficult or impossible if low down  
 utions  
 hands consider it safe and proper  
 ses if injected carefully and with surgical precautions

H. Scanes Spicer  
 F. E. Hopkins  
 St. Clair Thomson  
 W. W. Carter  
 John McCoy  
 H. B. Ellis  
 M. D. Lederman  
 J. F. Barnhill  
 F. J. Quinlan  
 Thos. W. Huntington  
 E. F. Ingals  
 A. W. Morton  
 A. E. Comstock  
 A. P. Voislowsky  
 E. Casselberry  
 C. W. Richardson  
 T. J. Harris  
 Wm. H. Luckett  
 S. G. Dabney, Louisville  
 Yankauer  
 R. Bishop Canfield  
 F. Kolles  
 N. E. S.  
 R. C. Myles  
 A. Coolidge, Jr.  
 J. C. Sharp  
 W. Phillips & J. Thomson  
 L. M. Hurd  
 S. W. Thurber  
 Walter J. Freeman  
 A. R. Baker  
 J. Goodale  
 W. F. Chappell  
 W. B. McAuliffe  
 Richard Lake  
 Walker Downie



rection of nasal deformities I have had only two unsatisfactory results, citation of which will be given later.

The history of paraffin injection is now an old story, and I only wish to call attention to the fact that it was first employed for the correction of nasal deformity by Gersuny of Vienna, in 1900.

In the summer of 1901 I began to experiment with the injection of liquid paraffin upon rabbits and upon the cadaver, and in November of 1901 I made my first injection in the nose of a young woman at the Manhattan Eye, Ear and Throat Hospital, at which time I used an ordinary hypodermic syringe and liquid paraffin with a melting point of 110° F. This case is still under my observation, and there is apparently no necessity for further injection. From outward appearances the nose remains the same in size and shape as when it was injected.

*Causes of Nasal Deformities.*—

1. Traumatism. This has been the most frequent cause of nasal deformity in those cases coming under my observation, and I believe it to be the most frequent in the experience of all operators.

2. Syphilis.

3. Abscess of the septum.

4. The removal of the cartilage of the nose in the submucous resection for deflected septa (Wm. E. Casselberry has had such a case.)

5. Lupus of the septum.

*Selection of Paraffin and its Preparation.* Too much importance cannot be attached to the selection of the proper substance for injection, whether it be purely paraffin or a mixture of paraffin with other substances.

The desirable substance is one with a sufficiently high melting point to reduce to a minimum globular formation when injected, and yet not sufficiently hard to produce inflammatory conditions by constant irritation of the subcutaneous tissues.

Liquid paraffin, or paraffin with a melting point below the body temperature, may readily enter the circulation or gravitate between the loose areolar tissue to undesirable locations, while hard rubber and celluloid invariably produce inflammatory conditions by their hardness, and slough out.

Emboli have frequently followed the injection of paraffin with a melting point of 92° to 100° F., or when paraffin of a higher melting point has been injected in a semi-liquid state. When the par-

affin is liquid or semi-liquid, it permeates the meshes of connective tissue and assumes small spherical shapes, which can unquestionably be taken up by the blood vessels.

My first observations upon the tissues of a rabbit when paraffin had been injected in a liquid state and with a melting point of 110° F. led me to suppose that a fibrosis occurred around each globule of paraffin, but later observations have shown that these globules were only surrounded by connective tissue of the part, and further, that only the larger masses of the paraffin were encapsulated with fibrous tissue when injected cold.

Without citing the various experiments upon the subject, and omitting the arguments of those favoring a soft paraffin, or those advocating a paraffin with a melting point as high as 155° F., I would say that a paraffin with a melting point of 115° F. would meet the requirements, and, if injected cold, would obviate the tendency to embolus formation, and yet be of sufficient hardness to produce a fibrous capsule which would prevent its subsequent shifting.

The conclusions of Luckett and Horn, after repeated experimentation, are that the more solid the paraffin at the time of injection, the more apt it is to be confined to one mass, and the less likely is it to spread throughout the tissues.

In 1904 I removed a section of tissue from the nose of a patient whom I had injected with liquid paraffin two years previously, and the observations made at that time by Dr. Jonathan Wright have in a measure been substantiated by more complete experimentation in the last few years. He called attention to the fact that some of the paraffin must have been carried off by the lymphatics, which was made easier of accomplishment by the fact that the paraffin was injected in liquid form. He further commented upon the specimen, saying: "Had not the experimental observations of others thrown the weight of opinion otherwise, one would naturally suppose from the examination of this specimen that the paraffin on entering the tissues was split up into separate globules, which gradually became surrounded each by its capsule of fibrous tissue. A fluid or semi-fluid, it would seem, would tend to flow along the lymph channels of least resistance and be broken up into larger and smaller globules. On the other hand, it is a little difficult to understand how the new connective tissue cells can shoot into a non-porous substance. This difficulty of conception is still further increased when we consider the use of melted paraffin which on hardening would



seem to offer an impenetrable mass to the invasion of connective tissue cells.

"In the semi-solid compounds with petroleum jelly, such as were used in this case, we, perhaps with less difficulty, can imagine the intrusion of the antennae of an amoeboid cell. Some of the animal experiments are not very satisfactory, when we remember the exceedingly loose subdermal connective tissue, as for instance in the rabbit.

"I would draw your attention to an interesting histological feature shown in Fig. 2, which I think has also been noted by other ob-

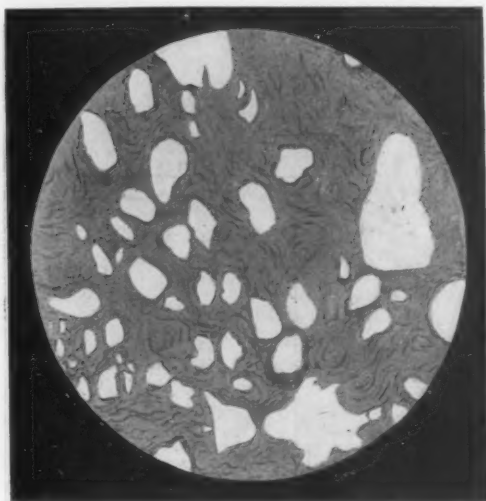


Figure 1. Microscopical appearance of paraffin in the tissues of the nose. Piece removed from nose of patient two years after injection.

servers. The latter have been referred to as giant cell formation, and perhaps in their specimens such evidence existed as to warrant the description. I think, however, here it will strike the observer that the large cells imperfectly lining the cavity in which the paraffin lay, are really nature's attempt to line it with the same sort of covering as that which lines the joints, the lungs, etc. Here it is clear these large cells are developed from the endothelium of the lymph spaces. Naturally, with giant cell formation we think of a pathological condition set up by a foreign body—here we think of a physiological, though artificial cavity, a more or less complete adaptation of the organism to new conditions.

"While we should naturally expect in such injections that the paraffin would at first be arranged in one lump, this is not what we should expect in the firmer connective tissue of man. It seems to have been shown that this more or less discrete lump in animals, beneath the skin, does finally become split up by the intrusion of connective tissue cells. If this be so, there is no reason why it should not also occur in man, though at first the infiltrating paraffin may be more diffusely scattered through the lymph spaces."

*Permanence.*—The permanency of the paraffin in the tissues depends upon the melting point of the paraffin and the state at the

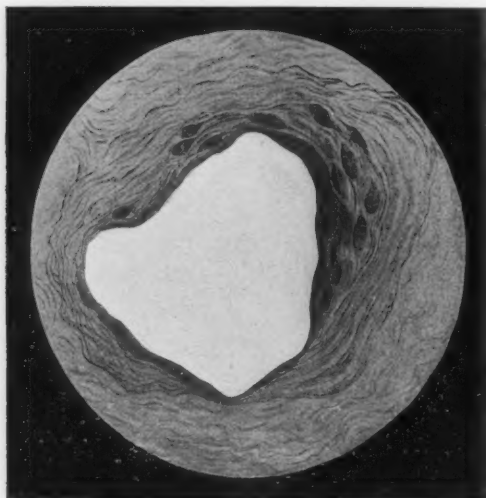


Figure 2. Microscopical appearance of one of the islands of paraffin under high power, showing the endothelial lining of the cavity.

time of injection. The colder the paraffin at the time of injection, the more lasting it will be in the tissues, likewise the better the anchorage insured.

*Paraffin Mixture.*—For a number of years I have used a paraffin with a melting point of  $110^{\circ}$  F., and the statistics show this to be the melting point most used. This paraffin was obtained by adding to commercial paraffin melting at  $140^{\circ}$  F. sufficient petroleum jelly to bring it down to  $110^{\circ}$  F. However satisfactory this paraffin has proven in my hands and in the hands of my colleagues, I am now inclined to believe that a higher melting point would be more practical, and have recently used a paraffin prepared in the

same manner, but with a melting point of 115° F. This, if injected cold, will be even less liable to assume a small globular shape, and will reduce still more the danger of an embolus. It has also the advantage of forming for itself a berth of connective tissue which will insure against subsequent displacement. A third point in its favor is that in very hot climates, or when a patient is subjected to extreme heat, there will be less tendency to soften.

The liquid paraffin called albolene is decidedly preferable to vaseline in reducing the melting point of the hard paraffin. Various combinations have been made in the preparation of a suitable substance for injection. White wax, rubber and wax, and rubber and paraffin, all have had their advocates. However, I can find no possible objection to the hard and soft paraffin, properly prepared, and with a melting point of 115° F.

*Instruments for Injection.*—At first it was deemed necessary to keep the paraffin liquid in order to inject it, and to meet this requirement numerous ingenious devices were constructed. Quinlan devised a syringe with a hot water jacket which was supplied constantly from a tank of hot water; Eckstein placed rubber tubing over the barrel of his syringe to preserve the heat; Walker Downie constructed one with the outside surrounded with a continuous platinum wire, which was kept hot by a current of electricity. All of these syringes having the preservation or the generation of heat as their object, were readily supplanted by one capable of expelling the paraffin in a solid state.

I devised a metal syringe with a screw piston, which would enable the operator to expel the paraffin cold. This syringe was presented to the American Laryngological, Rhinological and Otological Society in Washington in May, 1902, and was the first of its kind, so far as I know. This syringe possesses all of the qualifications necessary for the injection of solid paraffin, and has the advantage over a ratchet injector in being able to control the amount of injected paraffin to a fraction of a drop; while the injector necessitates injecting all of that which is included in the space controlled by a notch of the ratchet. (Figure 3, paraffin syringe.)

Broeckaert was the first to introduce the ratchet injector, since which others have added to the number. The injector has the advantage over the syringe in that one may inject with one hand and mould the paraffin with the other. It is also a better instrument for injecting turbinates, in cases of atrophic rhinitis. Pfau has manufactured a very complete instrument of the injector variety.

However, for practical purposes my screw syringe is as safe and satisfactory as any instrument that I know of. I believe a curved steel needle of large calibre and two inches long is the one best adapted to the purpose.

*Suitable Cases for Injection.*—Too much stress cannot be placed upon the selection of suitable cases for injection. The majority of bad results may be attributed to the improper selection of cases for operation. Syphilitic cases in which some activity is still present should not be injected, nor should any specific case be operated upon until a thorough anti-syphilitic treatment has been administered for some months. No case should be injected where all of the cartilaginous septum has been destroyed, as there is nothing below to support the paraffin above. No diabetic nor nephritic case should be injected, as the low vitality of the tissues will not stand



Figure 3. Paraffin syringe.

an increased strain. Scar tissue is always poorly nourished, and great care and judgment should be exercised in the attempt to liberate it from its source of nourishment and to make upon it an additional call for self-maintenance. Small quantities of paraffin should be injected beneath scar tissues at long intervals. No attempt should be made to inject beneath tightly adherent skin where an additional tension will occasion pressure, for in such cases necrosis is likely to occur.

Furthermore, I do not believe in injecting any case unless deformity exists which detracts materially from the appearance of the patient and renders him peculiarly sensitive to his appearance. The injection of paraffin to overcome slight inequalities of profile and to gratify the whim of some over-sensitive patient is unwarrantable, in view of the fact that quite a number of cases have proven unsuccessful in their ultimate outcome.

*Preparation of the Patient.*

1. Scrub the nose and adjacent areas with green soap and water.
2. Pour on some alcohol.
3. Cover the head with a towel wet with bichloride of mercury, and cover the arms and shoulders with a sterilized gown. The same preparation should be made here as for any minor surgical operation.

*Preparation of Instruments and Operator.*—The paraffin syringe, which is of metal, and the needle should be boiled. The paraffin, which comes in sterilized tubes, should be again boiled in a metal cup, which can be placed in any sterilizer, the bottom of the cup being raised sufficiently to prevent the paraffin from scorching. The paraffin is drawn up into the syringe in a liquid state, after which the syringe is dropped into a receptacle of cold sterilized

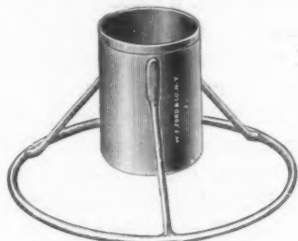


Figure 4. Paraffin cup.

water, which soon solidifies it. The hands of the operator and the assistant are both sterilized. (Figure 4, paraffin cup.)

*Methods of Injection.*—No anesthetic is necessary, although some operators prefer cocaine locally injected. I have found the cocaine as painful as the paraffin injection. I have the patient sit on a stool so that when the head is tilted backward the nose is about the height of the operator's elbow, with the arms hanging by the side. The operator stands on the left of the patient, and the assistant stands in front of and slightly to the right of the patient. The assistant grasps the nose firmly with the balls of his thumbs pressed against the nasal bones, and with the tips touching over the root of the nose. In this way pressure is exerted along both sides of the nose, and will prevent the entrance of the paraffin into the areolar tissue around the eye, and will also prevent it getting into the circulation, should the needle penetrate a small vein. I always inject from above downward, as this is in a direction away from

danger, and toward nature's natural barrier—which is the adherence of the skin and cartilage of the tip and alae of the nose.

Before the introduction of the needle I immerse it in hot water, and then give the piston several turns until the paraffin comes out in a hard cylindrical thread. The first few turns of the piston usually sends forth an interrupted stream of paraffin mixed with some oil and water, but in a few turns all of the oil and water have been expelled, and the paraffin remains, a solid block within the cylinder of the syringe.

At the point of injection I lift the skin up high with firm pressure and introduce the needle beneath the skin and into the areolar tissue above the periosteum. The point of the needle is carried just beyond the depression, when the injection is begun slowly and is continued as the needle is gradually withdrawn. I frequently stop the injection and mould the paraffin to meet the requirements of the case. During this time a second assistant holds the syringe, or the first assistant relinquishes his pressure and holds it while I note the results. I never make it an object to overcome the deformity at one injection, but in many instances I have found only one injection necessary. When anemia of the surface occurs I invariably stop further injection, as this is the danger signal that the tissue will stand no more. I withdraw the needle carefully and stop the hemorrhage, if there is any, with adrenalin, after which I put on a little collodion. If convenient for the patient to do so, I advise rest in bed for the remainder of the day, and the application of ice cloths. When the paraffin melts at 115° F. and is injected cold, it enters the tissue as a hard mass and cooling sprays are unnecessary.

A second injection should not be made sooner than a month afterward, for nature is having all she can do to take care of this first injection during this time, and any additional demand might result in necrosis.

*Accidents.*—The discussion under this head will be limited to those accidents resulting from injecting paraffin for the correction of nasal deformities.

*Embolus.*—There are three authenticated cases of thrombosis of the eye vessels immediately following the injection of paraffin for nasal deformity:

1. Amaurosis of the left eye, caused by thrombosis of the ophthalmic vein, reported by Leiser in 1903 (*Berliner Klinische Wochenschrift*, 1903, p. 13.)

2. Amaurosis of the right eye, caused by thrombosis of the arteria centralis retinae, reported by Hurd and Holden in 1903. (Medical Record, July 11, 1903.)

3. Amaurosis of the left eye, with temporary hemiplegia of a mild character which disappeared in a few days, reported by Thos. H. Huntington, in November, 1904.

The report of these three cases immediately prejudiced nearly every operator against the use of paraffin, without a consideration of the probable errors entering into the operation. These errors I believe are absolutely preventable. Should all hypodermic injections be given carelessly, without expelling the air bubble, I have no doubt the death rate from air embolus would increase amazingly, yet no physician hesitates to give a hypodermic. Here is a possible error easily avoided. In all three cases referred to above the accident occurred at the time of a second or third injection. The fact that thrombosis occurred in the second and third injection in each case would tend to show that the increased vascularity of the area favored the transmission of any small particle of paraffin away from that location, whether it be a part of the newly injected substance or a detached portion of that previously injected.

In case II the paraffin was injected in a semi-solid state; and in case III it must have been in a liquid state, as Dr. Huntington tells me by letter that he used an ordinary hypodermic syringe, by which only liquid paraffin can be injected. In case I the method of injection is not given, although the melting point of the paraffin is given at 110° F.

In none of these cases is any mention made of protection, by pressure, to the soft tissues around the eye, against the invasion of the injected substance. Hurd's case was the only one where the injection was made from above downward, and this was immediately following one made from the tip upward. I believe these accidents were due *primarily* to the absence of protection by pressure at the sides and root of the nose against the migration of paraffin particles, and *secondly* to the use of liquid or semi-solid paraffin. Had a solid paraffin been injected, with a melting point of 110° F. or above, and the injection been made from above downward, and firm pressure been made at the root of the nose, as I have indicated, I believe the accidents might have been avoided. I have reports by letter of 1,250 cases of paraffin injection, in which number three cases of thrombosis have occurred. In ordinary mercury injec-

tions there are records showing as high a proportion as 8.9 per cent of embolism (Luckett and Horn.)

Four conditions favor abscess formation:

1. Unsururgical methods, resulting in infection.
2. A second injection following too closely upon the first. This error resulted in one of the unfortunate experiences I have had in the injection of paraffin.

The case was sent to me by Dr. L. G. Woodson, of Birmingham, Ala. The tissues were very tight over the depression, and at the time I advised against an endeavor to overcome all the deformity in one week, the time the patient had arranged for his stay in New York. However, I made two injections in the seven days, and the patient returned home perfectly satisfied with the result. I should have considered the operation a success had I not interviewed Dr. Woodson some months later, at which time he told me that in about two weeks after the patient returned home the tissues broke down and most of the paraffin exuded, although sufficient of it remained, or sufficient fibrosis resulted from the resulting inflammation to completely overcome the deformity. I had added here additional work to an already overworked area, with the result that the vitality of the tissue was overcome. A similar instance is reported by Richards, of Fall River.

3. Abscess with sloughing occurs in diabetic, nephritic, and syphilitic cases.

4. Infection and sloughing occurs when paraffin is injected into the skin instead of beneath it. The skin is poorly nourished over these deformities, and injection into its layers still further reduces the blood supply to that particular area. Again, infection may readily travel through a sweat gland if the injection is made too close to the surface. (Richard Lake, of London, reports one such case.)

It would certainly reflect upon one's surgical judgment to offer confident solutions of all these problems, but the mere statement of how they occur suggests the method by which they may be obviated.

*Distribution to Undesirable Locations.*—All of the reported cases where paraffin has entered undesirable localities not intended for injection have been when the injection was made with a semi-liquid substance, with the needle pointing upward, and with insufficient precaution in regard to pressure.



With a solid paraffin, a screw syringe, with the needle pointing toward the tip, and with the fingers of an intelligent assistant to aid in the procedure, I believe there will be no case where paraffin will lodge in any other locality than the one desired. There may be one exception to this statement, and that is where considerable scar tissue exists at the site of the deformity, and the precaution to elevate this with a bistoury is not properly accomplished before the operation. Then, of course, the paraffin would go in the direction of least resistance.

*Shifting of Paraffin Subsequent to Operation.*—There are seven cases reported in my 1,250 cases operated upon. To this number I can add another of my own, which I have not seen, but which has been reported to me by Dr. W. E. Casselberry of Chicago. In this case I am not sure that the paraffin shifted, as I am of the opinion that I injected a column of paraffin along the ala of the nose to see if it would not aid in overcoming a relaxed ala. Of course paraffin may shift, but it has been clearly demonstrated by experiment upon animals that hard paraffin will create a fibrosis around the mass, while a soft paraffin will gravitate through the areolar tissue. To lessen the danger of shifting, inject the paraffin cold, as the nearer it approaches a discrete mass the more readily will a fibrosis form around it.

*Keloid.*—E. Fletcher Ingals of Chicago writes me that he considers the injection of paraffin dangerous owing to the danger of death, and to the fact that there have been at least eight cases of keloid following its injection. There is no doubt that a fibrosis is set up by paraffin injections, varying in intensity with the hardness of the paraffin. A paraffin melting at 155° F. would tend to produce as much fibrosis as a plate of hard rubber or celluloid. Keloid has never occurred where lower melting points have been used, so far as I know. I can see no reason why keloid should form when a paraffin of 115° F. melting point is used. I have never seen a case, and have never heard of a case occurring in the experience of any of my co-workers. Dr. Ingals tells me that these cases did not come under his personal observation.

*Carcinoma.*—Dr. R. Bishop Canfield of Ann Arbor, Mich., has given me by letter the only report of a case of this nature in any way connected with paraffin injection. The case is of sufficient interest for me to give it in full:

"In connection with your paper you will be interested in the following case which presented itself at my clinic some weeks ago. A

young boy, 17 years old, in whom nothing suggestive of syphilis could be discovered, with a history of having had a marked deformity of the nose corrected with paraffin some months before, showed a nose about twice the size of the normal, rounded on all sides and almost shapeless, red in color and giving the impression when palpated of being very dense. In both very hot and very cold weather it was bright red with dusky blue red spots. The patient said he knew that paraffin melting at 110° F. had been used, and that the nose was somewhat larger and redder now than it was some two or three weeks after the injections. It was so mortifying to the patient and was so dense that I determined to try to dissect some of the paraffin out. I neglected to say that the entire septum was about half an inch thick, and apparently filled with paraffin. I made a free incision into the skin over the area of greatest density, first on one side and then on the other, in the hope that I might be able to express out a little of the paraffin, but was unable to do so. The tissue *bled* very freely from all the cut surfaces. I removed pieces for microscopical examination. After the incisions healed there was, to my surprise, considerable improvement in color, which was decidedly less red than before, due, no doubt, to decrease in pressure following removal of the pieces of tissue. Microscopical examination by Dr. Warthin shows the perfect picture of squamous carcinoma. I have not seen the patient since a week after the operation. He has promised to return if the nose increases in size. If he does, I will let you know how he is."

In view of the fact that this patient's septum was filled with paraffin, it is reasonable to suppose that some growth existed before the paraffin was injected. I believe the new growth in this case was a coincident, and that the cancer was not the result of paraffin, but was possibly the cause of the condition for which the paraffin was used.

*Advantages Over Other Surgical Measures.*—Paraffin injected under proper surgical conditions and with the precautions advised in the preceding paragraphs will remain in the tissues and serve its purpose far better than the surgical introduction of silver, aluminum, or hard rubber plates, which invariably slough out. In the correction of nasal deformity by breaking up the nasal bones and breaking away the nasal processes of the superior maxilla to aid in forming the bridge, there is ordinarily too little septum to give the necessary support to insure a permanent structure, and the seriousness

of this procedure, with the necessary sojourn of the patient in the hospital, is a question which frequently determines the patient against the operation. Neither a general nor a local anesthetic is necessary in the injection of paraffin, and the patient may continue his work without scar or discomfort.

The history of the following case demonstrates the superiority of paraffin injections over the surgical insertion of silver or celluloid plates for the restoration of nasal deformities.

The patient, Mrs. N., was referred to me by Dr. George E. Brewer, August 7, 1907. She was 37 years old, and when a child her



Figure 5. Side view, showing marked depression. Before injecting paraffin.



Figure 6. Front view. Before injection.

nose was broken. An abscess of the septum followed, which resulted in loss of the septum and a saddle-back nose. Fourteen years ago she consulted Dr. W. T. Bull, who inserted a silver plate for the restoration of the bridge. This plate remained in situ for three years and gave satisfaction. At the end of this period inflammatory conditions began, which soon resulted in the extrusion of the plate. The patient then consulted Dr. Robert Weir, who inserted a celluloid plate, which came out in six weeks. Examination on entrance to the Manhattan Eye, Ear and Throat Hospital showed complete loss of all the cartilaginous septum,

nearly complete atresia of both vestibules, and marked saddle-back nose, with adhesions and cicatrices binding the skin close to the bones. My attention was directed first to the atresia, which was satisfactorily overcome by January 2, 1908, after the removal of nearly all the scar tissue in each vestibule, and the insertion of hollow splints for five months. I made the first injection of paraffin on the above date, and a subsequent injection two weeks later. The first injection was followed by no reaction whatever, but the second was followed by some edema under the eyes, and redness and



Figure 7. After injection.



Figure 8. After injection.

swelling over the nose—all of which finally subsided, and the result was obtained as seen in the photographs (figures 7 and 8).

*Deductions from Statistics.—*

Total number of cases reported by forty-one different observers, not including my own—1,252.

Of this number:

1,000 were entirely successful.

104 were unsatisfactory.

2 of the 104 cases resulted in blindness.

55 of the 104 cases resulted in sepsis and extrusion of the paraffin.

In 22 of the 104 cases the paraffin lodged in the wrong location.

In 7 of the 104 cases the paraffin shifted after operation.\*

The instruments used were ordinary hypodermic syringes, Killian's, Beck's, Pfau's, Broeckaert's and Smith's. The paraffin injected varied in melting point from 103° to 136° F., the majority using a paraffin melting at 110° F., and with the proportions originally suggested by the writer. The precautions against the distribution of the paraffin in undesirable localities were digital pressure and plates of lead and steel.

Thirty-one of the forty-one operators consider the procedure practical if proper precautions are observed, and if performed by an experienced operator. The other ten consider it dangerous, and in most cases unwarrantable. I have tabulated, as far as I could, the replies to my circular letter, and submit the result to you for closer scrutiny. I have given the names of those signing the letter, as I presume they gave consent to using their names by so doing. Those who did not sign may recognize their own statistics with their names left out.

*Conclusions.*—This operation is not without its dangers, which, however, now that we know of them, can be avoided. It is a practical procedure when performed by one of experience and with thorough surgical precautions.

The proper paraffin is one with a melting point of about 115° F. and made of hard and soft paraffin. The mixture must be injected cold, and the needle directed from above downward. The upper part of the nose must be protected by the digital pressure of an assistant, and the injection must be made slowly, and only in small quantities at each sitting. The second injection should not be made shortly after the first, but ample time should be given the tissues to regain their normal vitality before injecting more material.

Cold compresses after the injection favor the anchorage of the paraffin, and a collodion dressing over the entrance of the needle is a precaution against infection.

No syphilitic, diabetic, nor nephritic patient should be injected without due consideration to what has already been said; and, lastly, no attempt should be made to inject cold paraffin except with a screw syringe or with one of the ratchet injectors.

No. 44 West Forty-Ninth Street.

\*These figures will not sum up correctly, as some of the operators gave only their number of unsuccessful cases and omitted their total number of cases operated upon.

## THE REPAIR OF HARE-LIP AND CLEFT PALATE.\*

BY J. F. BARNHILL, M. D., INDIANAPOLIS.

The repair of hare-lip and cleft palate has heretofore been largely left to dentists and the general surgeon, chiefly, no doubt, for the reason that, as laryngology and rhinology developed to its present state in a comparatively short time, those who practiced these specialties have been kept sufficiently busy in perfecting operative procedures which have seemed more intimately connected with these fields. Moreover, only recently the specialist in diseases of the upper air tract was presumed to be more of a therapist than a surgeon, his training was usually not that of a surgeon, and hence, he was not often capable of successfully carrying out the complete and often difficult details of the surgical steps necessary to the closure of these congenital defects.

At the present time, however, when many of the problems connected with both the surgical and medical aspects of the diseases of the upper respiratory tract are more or less settled questions, and when many who limit their practice to these diseases have found that they must, of necessity, be surgeons, and have accordingly received ample training in the principles and art of modern surgery, the occasion seems now at hand for the laryngologist and rhinologist to claim his own, and to undertake this class of work, which, in the main, is less difficult than much of that which he is already doing. The repair of hare-lip and cleft palate should be included in the practice of laryngology and rhinology for the following reasons: 1st. The defects involve the structures of the upper air tract, often converting the mouth, nose and naso-pharynx into one cavity. 2nd. Voice production, or, at least, normal speech, is always greatly impaired. 3rd. The repair of the clefts involves the restoration of the nose and soft and hard palate to as nearly the normal as possible and in doing this the muscles of the soft palate and those which to a great extent regulate the patency of the Eustachian tube, are involved in the surgical repair. 4th. No one is presumed to have a better knowledge of all these structures and their functions than the laryngologist, and no one should be better able than he who is thoroughly trained to work in such cavities to carry out the delicate technic necessary to success.

\*Symposium paper presented at the 14th Annual Meeting of the American Laryngological, Rhinological and Otological Society at Pittsburg, May 29, 1908.

Statistics concerning the frequency of hare-lip and cleft palate vary somewhat, but an average seems as follows: One cleft palate in about every 5,000, and one hare-lip in about every 2,500 infants. Hence these affections are the most common of the congenital defects of the lip and mouth. The cause is a failure of union on the part of the several embryonic processes necessary to perfect development. The reasons for such failure to unite assigned by various writers are heredity, maternal impressions, and maternal disease and malnutrition. Arrest in the embryonic development of the embryonic structures concerned is often assigned as the cause of the cleft, but Brophy maintains that the parts are fully developed and that the cleft is solely the result of their failure to properly coalesce.

Time for Operation. Most surgeons now agree with Lane, Brophy and Ferguson that the best time to operate is soon after the birth of the child, many preferring to do so, especially when the defect is only a hare-lip, on the day following birth. Of course, should the infant be badly nourished, or in some other way affected, it would bear any operation badly and the procedure should be delayed until the causes calling for the delay have been remedied. If at birth the child is plump and well in every way, except the hare-lip or hare-lip and cleft palate, operation at this time is best, for if postponed the child will probably be found in a less satisfactory condition very soon for the reason that its defects prevent in a marked way its proper nourishment. Should the child have approached the age of dentition before consultation with the surgeon, it is wise to allow the teeth to erupt before the procedure for closing the gaps is undertaken, although infancy is the proper time to operate for the reason that at this age not only can the gaps be properly closed, but by doing so at this time the chances in favor of better phonation and satisfactory speech are greatly favored. Nevertheless, should operation be refused or neglected in early life, and the patient be seen in youth or adolescence, good cosmetic effects are often obtained, even though but little improvement in speech is possible and operation should not, therefore, be refused at any age.

The operations for hare-lip and cleft palate can be best described separately.

#### *I. Hare-lip.*

This defect may be single or double, and may or may not be complicated by cleft palate. The lip defect may amount to only

a small notch, which is scarcely noticeable, or it may extend into the nostril, and involve the alveolar process and superior maxilla toward and rarely even to the orbit. When the defect is double, the intermaxillary portion of the alveolus covered by rudimentary portion of lip projects forward at a varying angle to the natural plane of the alveolar arch, to which in some cases it is attached at almost a right angle to the tip of the nose, and anterior septal margin.

The plan of operation in any case must always depend upon the nature and extent of the defect. Each case should therefore be carefully considered upon its own necessities. In case an incomplete notch only is present, the operation for its correction is sim-



Figure 1. Child, age one year. Double hare-lip with projecting intermaxillary bone.

ple, and Nelaton's method of procedure can be successfully followed. This consists in transfixing the lip parallel to the mucocutaneous border of the notch for a distance dependent upon the depth of the defect, and at a distance from this border of from one-quarter to one-third of an inch. The lower portion of the incision is then pulled downward into a normal position when retention sutures are inserted.

When a single fissure extends up to, or into the nostril, either a unilateral or bilateral tongue-shaped flap may be cut from each lip, the plan to be followed depending upon the amount of tissue which is missing. The question of the number of flaps, their width and length, is a question in all cases to be settled by the operator at the time of operation. The principle should always be followed



of utilizing all the tissues that remain, to the end that as little subsequent tension as possible will be exerted on the retention sutures. In this respect Ferguson's plan of turning back flaps of mucous membrane from the upper three-fourths of the cleft, first uniting these, and then suturing the lip-margins is most excellent.

In cases of double hare-lip with intermaxillary projection which stands at right angles to the normal alveolus, and which is adherent to the tip of the nose, it is necessary to deal with such projection by a preliminary operation in which the misplaced part is dissected loose from the nose, and its osseous junction with the superior maxilla is fractured to such an extent as to permit its replacement in a position corresponding with the normal alveolar arch.



Figure 2. Same as figure 1, three months later, and after operation.

In addition to this it is best to freshen the adjacent edges of both the replaced intermaxillary process and the alveolar arch, and to approximate the same by means of silver wire sutures. Two weeks or more may then be allowed before the hare-lip is repaired. I know of no condition that would justify the complete removal of the intermaxillary portion, although this is advocated in several standard works on surgery. In case the deficiency extends into one or both nostrils, and as a result the cartilaginous wings are distorted and detached from the septum, the plastic repair must include the careful restoration of the same by their approximation and retention to their normal relation to the nasal septum. Sometimes this requires the resection of a portion of the cartilage in order to secure a proper contour of the nostril. In shaping the nos-

tril much assistance may be had by using a sound or bougie, over which each nostril wing is moulded and secured.

The failures resulting from repair of hare-lip are due, 1st, to malnutrition of the patient; 2nd, to improperly prepared or badly adjusted flaps, and 3rd, to too great tension on the sutures resulting from facial movements, or to the fact that the sutured portions of the lip were drawn into position without sufficiently

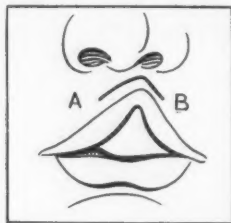


Figure 3. Nelaton operation. AB, line of incision through lip.

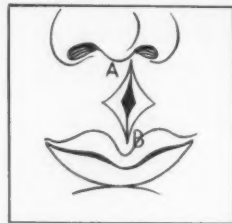


Figure 4. Nelaton operation; lip depressed, line AB thrown vertical.

releasing the attachment of the lip to the alveolar processes. The first and second of the above reasons for failure always involve the judgment of the operator, and do not, therefore, need discussion here. In every operation for hare-lip the amount of tension necessary to bring the separated portions of the lip together should always be tested, while the patient's face is in abso-

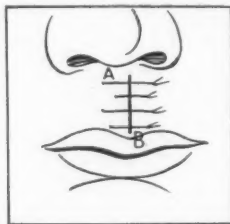


Figure 5. Nelaton operation, suture inserted.

lute repose, and unless the parts fall together quite readily and naturally, a small knife or a straight, sharp scissors should be thrust through the mucous membrane of the lip at its junction with the alveolus and the labio-alveolar separation accomplished through the smallest possible incision. Facial movements may be controlled, and the operated part put at complete rest by carrying a strip of adhesive plaster three-quarters of an inch wide over the line of in-

cision from one cheek to the other. Since this often becomes quickly soiled from nasal and mouth discharges, and requires frequent changing, much annoyance and pain are produced by necessary changes. An appliance which I have seen used successfully, and which I have employed myself with satisfaction, is that of H. R. Allen, which is made from a watch spring, and sets upon feet which are broad enough to distribute the pressure from the spring

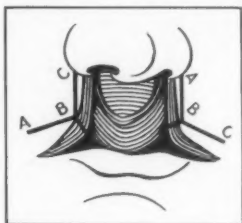


Figure 6. Operation for double hare-lip. ABC, lines of incision for making flap.



Figure 7. Double hare-lip. Construction of flaps.

over a sufficient area on each side to entirely relieve all tension upon the sutures. A chief value of the device is that dressings may be made for any necessary length of time without the slightest necessity of changing the instrument. (See figures 9 and 10.)

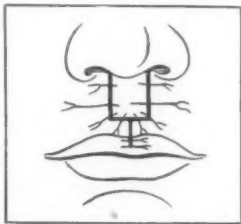


Figure 8. Double hare-lip. Flaps, adjuster and sutures in place.

## II. Cleft Palate.

Operative measures directed to the closure of cleft palate are more severe than those for the repair of hare-lip. The difficulties attending the performance of the former are greatly multiplied in comparison to the latter. Surgical anatomy, the mechanics of surgery and a thoroughly known surgical technic are necessary acquirements on the part of the surgeon.

*Choice of Time for Operation.*

It was formerly thought advisable not to operate for cleft palate before the age of two years.\* Most operators at the present time prefer operation during early infancy. Brophy, whose experience entitles him to speak with authority, states that the best age to select is within three months from birth, and he frequently closes the defect as early as the tenth day.

Briefly stated, his reasons for early closure are as follows: 1. The surgical shock is less. 2. The bones of the face at birth are pliable and malpositions may then be more easily corrected. 3. The earlier the correction of the defect, and therefore the earlier that the mucous and muscular structures are put into their new and more normal positions, the better will be the results as to voice and

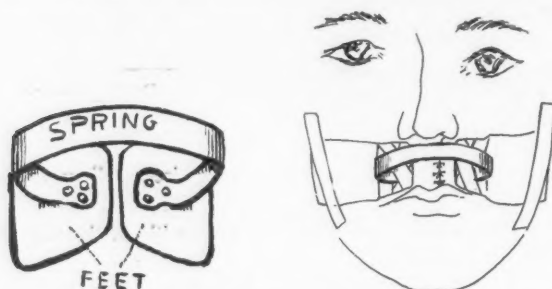


Figure 9. Allen's hare-lip spring. The feet are pulled apart before applying to the operated lip. The pressure of the spring holds the sutured parts snugly together till healing takes place.

Figure 10. Allen's hare-lip spring applied, showing adhesive plaster fastenings. Antiseptic gauzes are readily applied between the lip and spring, and these can be changed as often as necessary without in any way disturbing the wound.

speech. 4. A more normal shape and position of the superior maxillae, and especially of the alveolar process is established by early closure.

*Technic of the Operation.*

This depends greatly on the age of the patient at the time the closure is undertaken. When the child is seen at birth, or during the first three months following, I believe the plan of procedure advocated by Brophy is best. This operator has shown to my own satisfaction that the cleft in the palate is not due, as usually stated,

\*Augenbach and Trelat preferred operating at seven years. Roux believed operation should be delayed as late as sixteen years. Kirmisson, of Paris, does not state an exact age of choice, but indicates that it should not be done during the early years of childhood.

to an *arrest* in development, and a consequent *deficiency* of tissues, but that the fissure occurs as the sole result of the failure of the two sides to *unite*, even though sufficient material is present. The failure, therefore, being one of lack of union, the logical procedure would seem to be one of bringing the two sides of the head into apposition and of anchoring them there until union takes place. This Brophy accomplishes by the following steps:

The infant is prepared by cleansing the mouth with antiseptic washes. Chloroform is administered through the tube of a spec-

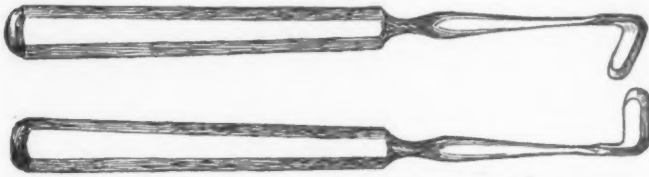


Figure 11. Brophy's curved periosteotomes used in the elevation of the soft tissue of the hard palate. There are a number of these instruments, varying from a right angle to the acute angle shown in the drawing.

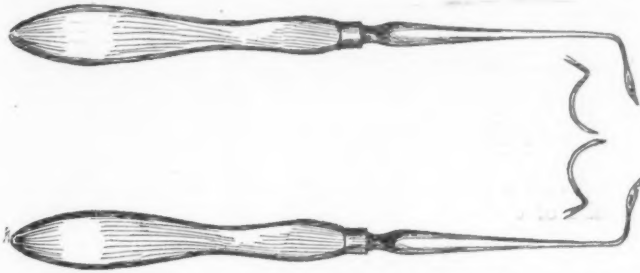


Figure 12. Deschamp's needles used in the introduction of tension sutures.

ial device. A mouth gag is inserted. (See Figs. 11, 12 and 13 for the several instruments necessary to this operation.) The edges of the cleft are denuded, including a shaving from the bone, if thought necessary. The cheek of one side is then retracted, and a specially devised needle which is threaded with braided silk is inserted into the alveolar process from the outside, at a point near the posterior margin of the hard palate, and on a level with the horizontal table of the palate bone. It is thence pushed inwardly through the substance of this plate until the point emerges in the central cleft and the silk braid is released. This same procedure is repeated on

the opposite side. By attaching one of the silk threads to the other in the cleft, a single thread is drawn from the exterior of the alveolus on one side, through the intervening bone, across the cleft, to the opposite side. A No. 20 silver wire is then attached to the silk thread and drawn through to the opposite side, thus substituting the silver for the silk sutures. Near the front of the alveolus a second wire is passed from side to side in an exactly similar manner as the first, only that the wire is carried above, and not through, the bony structure of the hard palate.

In order to prevent these silver sutures from cutting out, two lead plates, one for each side of the alveolar process, are shaped to fit the respective processes they are to cover, are perforated by two

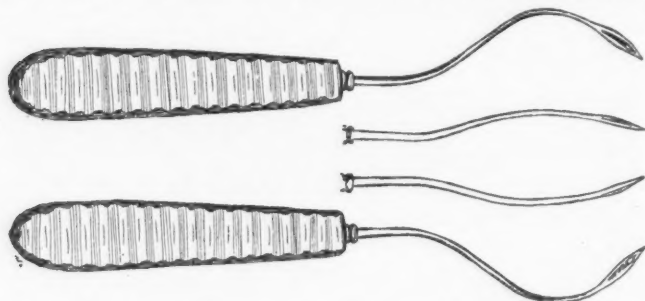


Figure 13. Brophy's strong needles used in the introduction of silver tension sutures through the maxillary bones.

eyelets which are the same distance apart as are the two wires at the point of emergence, and through these the wires are passed, drawn tightly, and twisted one to the other. The lead plates are well tolerated, and effectively prevent the wires cutting through the alveoli. Force applied by means of a specially devised clamp may be necessary to approximate the two lateral halves of the jaw during the twisting of the wire sutures.

In case there is a wide gap between the margins of the palate bones and the structures to be approximated are unduly resisting to the tension of the wires, it may be necessary to cut through each malar process. If this be done, the bone should be severed through a small submucous incision, since otherwise the fractured alveolus would be inefficiently supported, and might be readily displaced into a malposition.

The line of approximation of the two mucous edges of the cleft should be examined on the oral surface, and should they not lie

in perfect apposition any required number of fine silk sutures may be inserted before considering the operation finished.

In operations performed on infants having both hare-lip and cleft palate, the palate should be repaired first, for the reason that the extra space given to the mouth on account of the lip defect aids greatly in carrying out the necessary steps of the palate operation.

*Operation on Cases More Than Three Months Old.*

In the event that the individual has passed the age when it is longer possible to approximate the two lateral halves of the superior maxilla, as just described, some form of flap closure is usually to be chosen, and from the many plans advocated by various operators I have employed the one known as the Davies-Colley operation. One of the chief difficulties in any plan of procedure is to overcome the tension upon the sutures during the time required for union of the fissured structures, and the method suggested by this surgeon overcomes this as well or better than any other I have tried.

The operation consists in the dissection, from the palatal surfaces, of three flaps, and of making one incision. It is sometimes called the double-door operation, for the reason that two of the flaps swing together on hinges from the whole distance of the marginal clefts. These flaps are so turned and permanently fixed during the operation that the upper surface of the whole cleft is covered by mucous membrane taken from the oral surface of the palate, and the oral surface of the cleft is reinforced and greatly strengthened by a large muco-periosteal flap which is turned across the cleft with its mucous surface looking downward. This arrangement brings the periosteal surfaces of all the flaps into direct apposition with each other, and in these osteoblasts form, and a more nearly normal palate may be expected. Moreover, the pressure of the patient's tongue against the roof of the mouth, which will be more or less firm after any operation, will, in this one only, press the two raw surfaces more firmly together, and will, therefore, favor rather than hinder the reparative process.

Descriptions of operations like this are worthless and I therefore refer to the figures. The steps are, 1st, an incision A B close to the alveolus, and with its center at the last molar tooth. The incision is made down to the bone over the hard palate, and transfixes the soft palate for a distance dependent somewhat upon the width of the cleft. The tensor palati and levator palati muscles

of one side are, of course, divided by this incision. An incision is then started at C, and is carried downward on the same side about one-quarter of an inch from the border of the cleft through the length of the hard palate, but as the posterior border of the hard palate is reached, the incision is brought to the margin of the cleft, whence it is continued in such way as to simply divide the two surfaces of the soft palate and uvula, the incision finally ending at D. Another incision is begun at F on the opposite side and continued along the border of the cleft of that side at a distance of one-sixth to one-fourth inch, until the posterior edge of the hard palate is reached, at which point the cut is brought to the edge

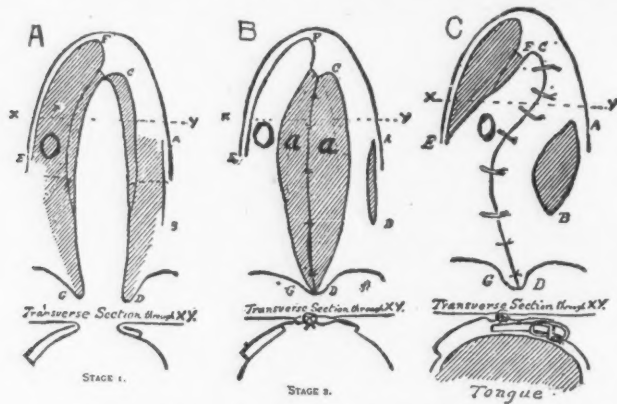


Figure 14. Davies-Colley Operation.

of the cleft, and continues as a splitting incision of the anterior and posterior mucous surfaces ending at G. A fourth incision is begun at E and continued to F, thus completing the outline for the third muco-periosteal flap.

2nd. The next step of the operation consists in the elevation of all these flaps. By means of one or more elevators of suitable size and curve, the flaps are loosened from the bone over all the shaded areas shown in Fig. 14, A.

3rd. The two marginal flaps are then turned toward each other and sutured as shown in Fig. 14, B. This accomplished, flap O is turned across the field of the sutured flaps a a, and is sutured in to the position shown in Fig. 14, C. In order to relieve any undue tension that may be found present at the time of introducing the sutures, it may be found necessary to lengthen incisions A B, or to



carry the incision at E to a lower point, and to elevate the muco-periosteum over a greater area. The suture material may be ten day chromic catgut, silk or wire, according to the preference of the operator. Davies-Colley recommends fine silver wire.

The after treatment is much the same following any plan of operation. The mouth and line of sutures should be gently sprayed with normal salt solution several times a day. The nourishment should receive very great care. The child should be given its milk from a spoon, and not from the nipple of a nursing bottle, which would likely disturb the sutures. The child should be kept in the open air and sunshine if the weather will permit, and if not, the ventilation should be the best possible to secure. Provision must be made for preventing the infant cramming its fingers or hands into its mouth.

#### *Results.*

If the operation for hare-lip and cleft palate prove entirely successful two benefits should be noted, viz.: The marked change of feature and an improvement in voice and speech. The former is, of course, immediate, while the degree of benefit to the voice and speech can only be estimated as the child acquires a knowledge of spoken words. As a rule, the earlier the operation for cleft palate is performed, and the smaller the amount of injury done to the palatal muscles during the operation, the better will the voice be. Following operations in adult life, especially if the palatal muscles have been severed, and much thickening and scar tissue of the soft palate results, very little good will result to the defective speech. Early operations, and plans of operating which will not interfere with muscular action are, therefore, always to be advocated.

No. 323 North Delaware Street.

## THE COSMETIC AND PLASTIC SURGERY OF THE EAR.\*

BY M. A. GOLDSTEIN, M. D., ST. LOUIS.

Cosmetic surgery, employed in the correction of deformities or abnormalities of the external organs of the head, is a comparatively new field of work to which the oto-laryngologist has, as yet, contributed but little of his time, talent or technical skill.

This department of surgery has been for the greater part in the hands of the "advertising specialist" and "beauty doctor." The work of correcting featureal defects or deformities has received but little legitimate recognition in the nomenclature of classic surgery, nor has the necessity for such surgery been deemed sufficiently justifiable to engage the serious attention of the busy surgeon. A markedly crooked nose, or an irregularly enlarged ear, may not seriously handicap the functions or utility of the general economy, but the patient may be just as sensitive and conscious of such a defect and anxious for its correction as he would be to have a genuvarum straightened by the orthopedist, or a strabismus corrected by the ophthalmologist. This form of surgery is dignified, delicate and justifiable, and may call into service all the skill and technical ability at the command of the surgeon.

There are many forms and variations of the surgical technique employed in this work; the operations may be performed without serious inconvenience to the patient, and in most instances without a general anesthetic; complications and serious sequelae should be of very rare occurrence if the usual aseptic and surgical precautions are observed; the ultimate results are gratifying both to the patient and to the operator.

The correction of defects of the nose and ear is distinctly within the province of the oto-laryngologist, and it is our opinion that we may confer an additional boon on humanity by wresting cosmetic surgery from the hands of the quacks, where it has seemed to flourish until now, and giving it a legitimate place in our earnest considerations and active work.

I have classified cosmetic and plastic surgery of the ear in three subdivisions:

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(a) *The correction of defects and deformities of the external ear, including the many abnormalities and congenital stigmata to which the human auricle is heir.*

(b) *A discussion of the plastic technique, following the radical mastoid operation, with special reference to the operative details in the formation of the various flaps, and a comparison of the special advantages of each of these plastics.*

(c) *The correction and closure of persistent retro-auricular openings following the radical operation, and a consideration of the various methods to perform such plastic.*

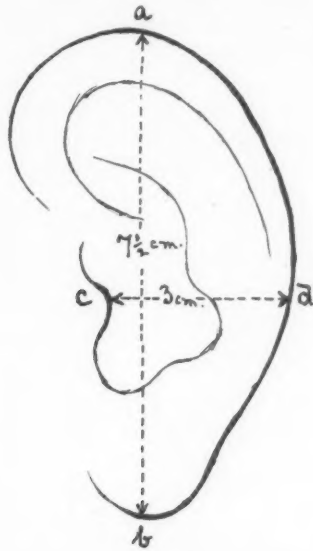


Figure 1.

Diagrammatic representation of normal ear measurements.

There is perhaps no part of the human anatomy that is subject to greater variation in size, shape, and development than the external ear; to even the casual observer a considerable abnormality in the size and shape of the auricle may make a definite impression of disfigurement. It may be impossible, therefore, to create any standard for a normal ear, or to empirically specify to what extent the deviation from such standard may take place without justifying surgical intervention. Until the technique of correcting deformi-

ties of the external ear is more accurately developed, and until this field of plastic surgery gains greater favor with the otologists, it may be well to confine our efforts and energies to the correction of those aural abnormalities where conspicuous deformity exists, and where the patient desires such correction because of the many personal embarrassments and comments to which such deformity may subject him.

An empirical standard may be established by measurements of the long and short axes of a large number of normal-shaped ears. The long axis should be measured from the most dependent part of the lobule to the crest of the helix, as indicated in line *a b*, Figure 1. The short axis is taken from the inner curve of the tragus to the arc of the helix at right angles of line *a b* to line *c d*, Figure 1.

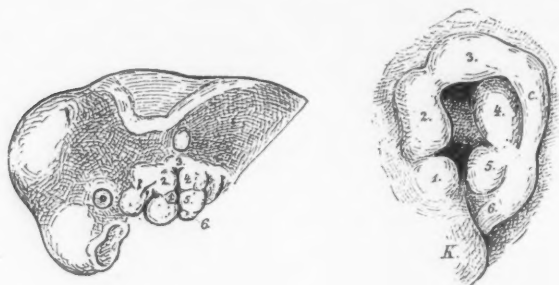


Figure 2.

Head of Human Embryo (His). Above the first branchial cleft lies the ear vesicle. Surrounding this cleft are the six tubercles of which the external ear is formed.

Human Embryo (His) showing the six tubercles of which the several parts of the external ear are formed. 1. Tragus. 2 and 3. Helix. 4. Anti-helix. 5. Anti-tragus. 6. Lobule. K. Inferior Maxilla.

These measurements are expressed in an average of a large series of ears as follows:

Long axis, or length of ear,  $7 \frac{1}{2}$  cm. (3 inches); short axis, or width of ear, 3 cm. ( $1 \frac{1}{4}$  inches.)

In the long axis all measurements exceeding three inches, or less than two inches, indicate an abnormal measurement. In the short axis a width of less than one inch, or of more than one and a half inches, is regarded as abnormal.

Aural embryology offers the first evidence of the great variation in the construction of the external ear. Minot states that "before

the end of the first month there appears around the external opening of the first gill-cleft a series of six tubercles, two in front on the hind edge of the first visceral arch, one above the cleft and three behind it. A little later a vertical furrow appears down the middle of the hyoid arch in such a way as to mark off a little ridge, which joins on to tubercle 3, and descends behind tubercles 4 and 5. The second stage is reached by the growth of all the parts; diffusion of tubercles 2 and 3, and the growth of the ridge down behind tubercle 5, to become continuous with tubercle 6. After these changes it is not difficult to identify the parts.

"Tubercle 1 is a tragus; 2 and 3, together with the arching ridge, represent the helix; 4, the antihelix; 5, the antitragus; and 6, the lobule; the pit between the tubercles, the fossa-angularis. During the latter part of the second month the ear changes in its proportion somewhat in the irregular development.

"The third stage begins at the third month; the upper and posterior part of the concha arises from the surface of the head and gradually but rapidly bends over forward, so as to completely cover the antihelix and the upper portion of the fossa-angularis. During this stage in mammals the assumption of the pointed form of the ear commences.

"The fourth stage commences at the fourth month, when the tubercles, which are now joined together by cartilages, commence to unfold and are complete by the fifth month. Finally the sixth tubercle develops to form the lobule."

Talbot, in his excellent monograph, "The Degenerate Ear," expresses the relation of embryologic development to aural deformities very tersely and clearly, as follows:

"This unfolding or development of the tubercles to produce the different portions of the ear and make it complete is not unlike the development of a flower from the bud. By this process may be understood how, if by malnutrition in one tubercle, or bud or another, or should there be a larger supply of nutriment in one than another, malformation of the ear would result. If an arrested development of all the tubercles should take place at any period from the first to the fifth month of foetal life, the ear would resemble a semi-developed flower."

The anomalies of form to which the external ear is liable have been the subject of considerable anthropological research, and the impetus to this research was given by the keen observations and

accurate conclusions of the eminent Italian criminologist and anthropologist, Lombroso.

About fifteen years ago Gradenigo created additional interest from an otological point of view, by the publication of his classic anthropological studies, "Ueber die Formanomalien der Ohrmuschel."

The most conspicuous of the anomalies as classified by Gradenigo are:

I. Macrotia and Asymmetry of the Auricle. Where the distinct variation in size and shape of the two auricles in the same pa-



Figure 3.

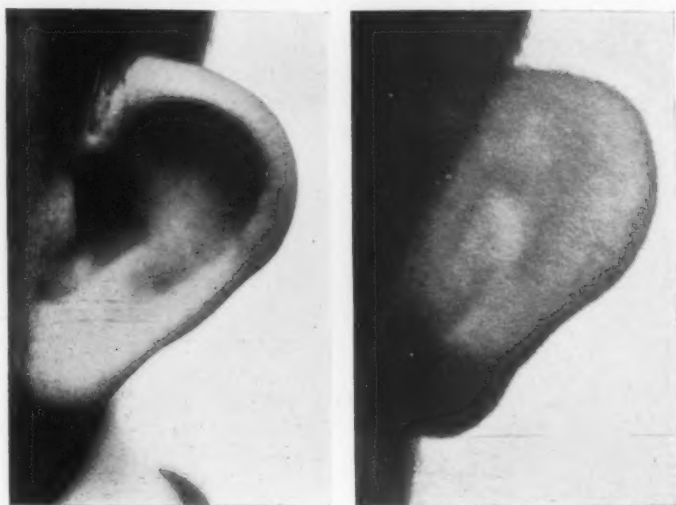
Asymmetry of the Auricle.

tient exists, it has been found, with but few exceptions, that such asymmetry is associated with facial asymmetry. In this subdivision of asymmetry of the auricle will be found a large proportion of the cases that come under our observation for legitimate correction.

2. Heterotopy. Cases of misplacement, displacement and abnormal insertion of the auricle are rare, and are to be found only in the most marked deviations of embryologic development and especially in certain monstrosities known as otocephali. A number

of the earlier writers have reported such remarkable cases; Sebenicius reports an auricle inserted on the neck; Wolf, a case inserted on the shoulder; and Phelitz and Stark, an auricle located on the cheek. This class of cases is hardly to be considered within the field of plastic surgery, unless it were possible in these rare instances to transpose the auricle entirely to its proper position.

3. Adhesion of the posterior surface of the auricle, in whole or in part, to the head. These conditions, as anomalies, are extremely rare, and find no definite embryologic significance.



Anterior View.

Posterior View.

Figure 4.  
Projecting Auricle.

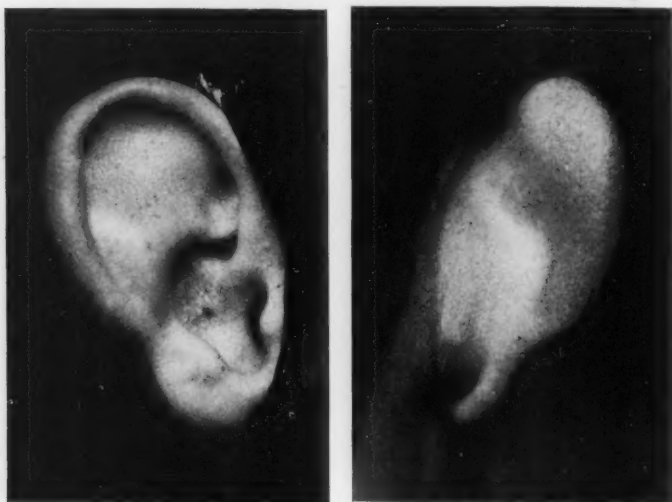
4. Projecting auricle. (Prominent ear.) The auriculo-temporal angle, as observed by Frigario, measured between the side of the head and the posterior surface of the auricle, is an acute angle in the normal ear. When, however, the auricle stands at right angles, or in even more exaggerated forms at an obtuse angle, it assumes the characteristic appearance known as the projecting or prominent ear. This abnormality of position is perhaps the most frequently observed of all deformities of the external ear, and has both an important embryologic and anthropologic significance.

When the ear is thus unduly prominent, especially when observed in early youth, its surgical correction is simple, the result satisfactory, and the patient saved much embarrassment. This deformity predominates in men.

5. The pointed ear. (The Darwin tubercle and the Satyr point.)

The Darwin tubercle results from an incomplete involution of the helix; the Satyr point occurs in quite a similar manner on the superior border of the helix.

When either of these deformity areas of the helix is marked they may be promptly corrected by a slight plastic on the posterior



Anterior View.

Figure 5.

Posterior View.

Absence of Antihelix, Projecting Ear and Redundancy of Concha Cartilage.

surface of the helix, and the resection of a narrow wedge of skin; if necessary, even the projecting portion of cartilage may be pared off subdermally.

6. The Macacus ear. (Also known as Darwin ear.)

In this deformity there is a flattened or imperfectly defined helix, or there may be even an absence of a section of the helix.

7. Wildermuth ear. (Prominence of the antihelix.)



The antihelix may develop so prominently that it may overshadow the helix when the auricle is seen in profile, and the ear assumes a characteristic aspect. This anomaly has been observed more frequently in the female. In this malformation there is an exaggerated absence of the normal shell-like concavity of the concha and pinna. In this form the anterior surface of the auricle appears flat, and in some cases the anterior surface is even convex.

8. Absence of the helix.

This condition is extremely rare, and would offer but little practical opportunity for plastic, for when there is a distinct absence of



Figure 6.

Darwin Tubercle; Satyr Point.

this delicately formed cartilage of the helix, antihelix or tragus, it is a difficult surgical task to shape one, or to construct it from other or adjoining tissues.

9. Absence or exaggerated development of the lobule.

It is a well-known observation that deformities of the lobule are conspicuous and apparent even to the laity. Complete absence of the lobule is not infrequent, and produces a very characteristic appearance of the ear. In this class of cases the cartilage is distinctly

bound round by integument, and the familiar pendent portion, comprising the lobule, is absent. Exaggerated development of the lobule, either in length, in breadth or in thickness, is occasionally met with, and in such marked degree that a correction of this deformity offers a grateful field for plastic surgery.

10. Adhesion of the lobule. (Synechia.)

When the adhesion of the lobule is symmetrical, and the area of the external ear comparatively normal in appearance, it does not

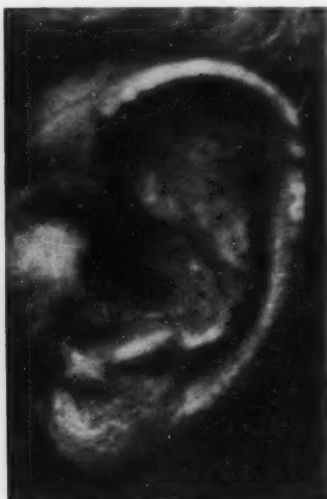


Figure 7.

Macacus Ear; Darwin Ear.

offer a conspicuous abnormality, but when there is a synechia of one lobule and the other lobule is normal, there is justification for its surgical correction.

This classification is a comprehensive one, and includes the major deformities to which the external ear is subject; many of the abnormalities, when sufficiently marked to warrant surgical interference, can be corrected by the several forms of plastic technique, which I will endeavor to describe:

## PLASTIC TECHNIQUE.

The experiences which we have gleaned in the past few years in perfecting the details of submucous operative work on the nasal septum offer a new field in plastic ear surgery, for by applying the same principles which have been so successfully used in submucous work on the cartilages of the nose, to subdermal manipulation of the elastic cartilages of the ear, we are enabled to obtain satisfactory results in the correction of deformities, by measures which if formerly adopted would have been found impracticable and inadequate.



Figure 8.

Wildermuth Ear; Prominence of the Antihelix; Absence of Lobule.

*Correction of macrotia:—*

Macrotia or undue length or width of the auricle may be such a conspicuous deformity that the patient will be glad to find relief for this condition, providing the reduction in the size of the ear can be effected without much pain, loss of time, or perceptible scar. The operation which seems to have gained some favor for the cosmetic correction for this deformity, and which is occasionally briefly described in the modern text books on surgery, is illustrated in plate I (figures 1, 2 and 3).

An incision is made through the entire thickness of the auricle, from *a* to *b* (figure 1); the upper incised segment of the pinna is pulled downward over the lower segment, and with this traction the operator gauges the amount of tissue necessary to be removed at the line *d b* (figure 2), to correct the deformity. An incision is made from *d* to *b*, and the overlapping triangle of tissue, *d b c*, composed of the cartilages and of the anterior and posterior surfaces of integument, is entirely removed.

The axis of the helix at *d b* is now seen to be shorter than the axis of the helix at *a b* of the lower segment. To obviate this, a



Figure 9.

Absence of Helix.

narrow, wedge-shaped segment, *x y z*, is now removed, so that the line *d b* and the line *a b* may be of the same length, and the edges of the helix at the points *a* and *d* are in one continuous curve.

The edges *d b* and *a b* are now united by sutures alternately from the outer and inner surface of the ear, and a small suture may also be introduced, uniting the small wedge-shaped incision from *x* to *z* (figure 3). This technique will reduce both the length and the width of the auricle to such a size as the operator may elect.

The objections which may be offered to this method of operation are, that some scarring will result, both to the anterior and posterior surface of the auricle, and that the complete resection of the cartilage, without furnishing any underlying support for the newly constructed resected area, is a weak surgical principle. The cartilages of the ear are too poorly nourished, and the healing of such a wound will take place mainly in the thin integument, and will leave a permanent weak spot at the lines of incision through the cartilage.



Figure 10.

Abnormal Length of Auricle and of Lobule.

*Author's operation for correction of macrotia:—*

To overcome these objections I have devised an operation which is simple, safe, and surgically sound. The principle of this technique is that of separating the cartilage from its perichondrium and skin covering, both anteriorly and posteriorly; of constructing flaps of cartilage to meet the requirements of the case in hand; of

sliding the two cartilaginous flaps over each other; to effect a firm junction at the area of resection; and to do all of the operative manipulations on the posterior surface of the auricle, so that when the single external incision is healed, an almost invisible linear scar on the posterior surface will be the only evidence of the operation.

The curvilinear incision *a b* (plate II, figure 1) is made on the posterior surface of the auricle, almost corresponding with the natural ridge of the antihelix anteriorly. The convexity of this curved incision line presents outward towards the rim of the helix. The



Figure 11.

Abnormal Width of Lobule.

flap is shaped so that when it is dissected upwards and over toward the mastoid area, the largest possible surface of cartilage is exposed. The dissection of the integument flap and perichondrium from the cartilage is simple, and as the adhesion of the perichondrium is not firm, it can be quickly done.

When the cartilage is cleanly exposed, an incision in the line *e f* (figure 2), curving inwards, almost at a right angle at points *e* and *f*, is made through the cartilage, care being taken not to wound the underlying integument which forms the anterior covering of the auricle. With a narrow, blunt elevator, such as is used in the re-

section of the nasal septum, the two cartilaginous flaps at *c d* and *e f* are now carefully elevated from the underlying perichondrium to a sufficient breadth to admit of their manipulation, and to permit the flap at *c d* to be superimposed upon the flap at *e f*, when brought together by a series of two mattress sutures, each suture being passed twice through each of the cartilages. When gentle traction is applied in tightening the sutures, the two cartilaginous flaps will be drawn over each other and the width of the auricle reduced in the same proportion as the sutures are introduced from the edges of the respective cartilaginous flaps.



Figure 12.

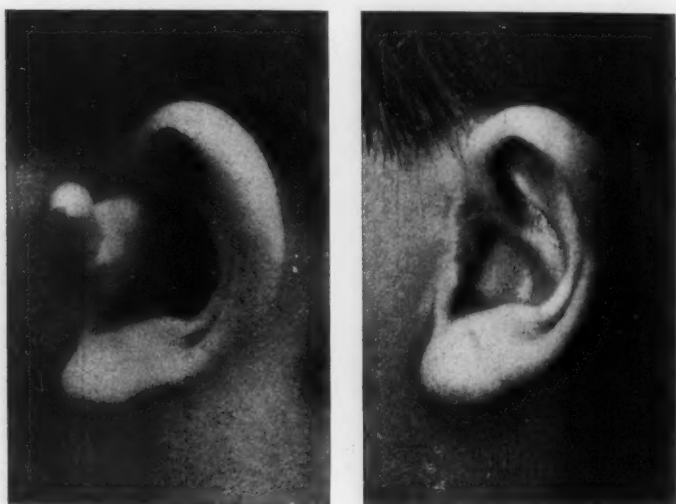
Synechia or Adherence of Lobule.

The sutures are applied by first passing a sharply curved needle, armed with thin chromatized catgut, through a point at the upper end of flap *c d*, then downward through a point just opposite in flap *e f*; then from below upward through flap *e f*, then over and under through an opposite point in flap *c d*.

Another suture is similarly placed in the lower part of these flaps. The cartilage is tough, and will stand considerable traction when the sutures are brought together. The sutures are then tied over flap *c d* (figure 3), the redundancy at the edge of the integument

flap *a b* is then carefully cut away and the integument stitched in position in the original line of incision (figure 4). With the traction produced by the overlapping of the cartilaginous flaps, some slight wrinkling or puckering may at first appear on the anterior surface of the auricle, but if the anterior perichondrium and integument have been liberally elevated from the cartilage, this wrinkling of the integument will disappear with the healing of the wound.

I have simply described the technique for reducing the width of the auricle by modifying the line of incision and shaping the curve of



Before Operation.

After Operation.

Figure 13.

Supernumerary Tragus.

same to conform to the area where reduction of length or width of the auricle is desired. This operation may be utilized for the correction of any form or extent of enlarged auricle.

An examination of such an ear after the wound has healed will show the reduction in the length or width of the auricle, shaped according to the judgment of the operator, and will present a reinforced and overlapping cartilaginous surface at the area of resection and an almost invisible linear scar on the posterior surface of

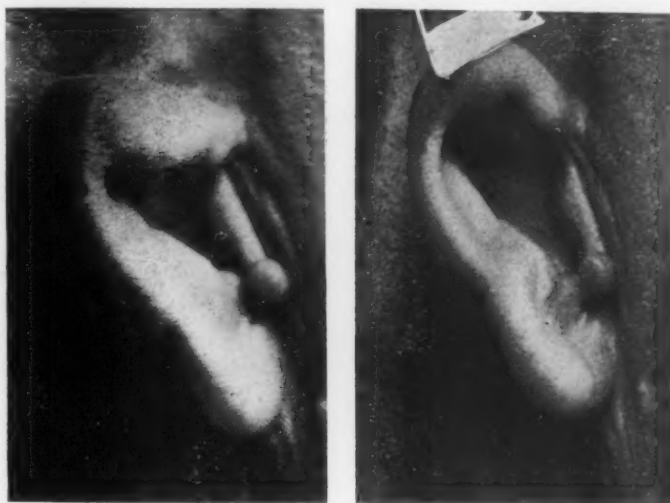


the auricle. The anterior surface of the ear shows no participation in this operation.

I believe that this method of operation, with such modifications as may suggest themselves to the operator, in the re-shaping of each given case, may be utilized for the cosmetic correction of all forms of macrotia and abnormally enlarged ears.

*The correction of the prominent ear:—*

The correction for the prominent or projecting ear has been, perhaps, the most popular and most frequently undertaken of any



Natural Position.

Helix stretched upwards showing deep fistula and undeveloped tubercle.

Figure 14.

Multiple Deformity of Auricle.

(Case of Dr. J. B. Shapleigh.)

in the field of cosmetic surgery of the ear. Where this deformity is very apparent, and where the auricle projects at an unusually prominent angle, the cause may be ascribed to an undue redundancy and elasticity of the cartilages of the pinna. In some of the chapters on plastic surgery in surgical text books the correction of this deformity has been dismissed with but a few words, and the opera-

tion suggested for this correction has consisted simply of an incision of an elliptical section of skin over the posterior surface of the auricle, close to the insertion line of the auricle to the head, and the operation completed by a line of sutures of the two presenting integument flaps. In the unduly prominent ear there is a preponderance of cartilaginous surface, and this simple form of operation is insufficient.

We again draw on our experience in the plastic surgery of the nasal septum where it has been definitely determined that the correction of deflected septa is not overcome until the redundancy of

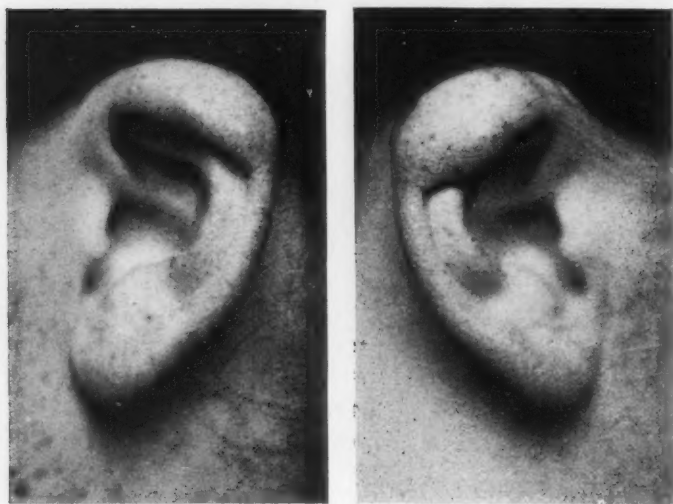


Figure 15.

Redundancy and Deformity of Helix.

cartilage is removed. This same principle must apply in the correction of the prominent ear; the biconvex lens-shaped section of skin, *a b c d* (plate III, figure 1) is removed; a narrow elliptical section of cartilage, *e f* (figure 2), is now carefully elevated and excised; the cartilaginous edges, *e f*, are drawn to the periosteum, *g, h*, by three or four thin catgut sutures (figure 3), and the two skin edges *a d b* and *a c b* are sutured (figure 4) in position.

The principal object in this simple operation is to remove the redundancy of cartilage and reinforce the skin traction by anchoring the underlying resected cartilage to the periosteum over the mastoid area.

*Correction of the misshapen helix:—*

This deformity rarely assumes sufficiently prominent proportions to warrant surgical intervention, even for cosmetic reasons, but at times a slight operation may be grateful to patients, especially women of comely appearance, where such deformity offers much



Figure 16.

Deformity of Auricle, produced by Perichondritis and Necrosis of Cartilage following the Radical Mastoid Operation.

embarrassment. In many of these cases I have found a redundancy and curling over of the skin covering the helix rather than a hyperplasia of the cartilage comprising the helix. In this class of cases it is simply necessary to make an elliptical resection of the skin over the posterior area of the pinna, near the helix, thoroughly detach the integument from the cartilage of the helix, so that it may be easily drawn backward, and suture the two surfaces of skin with a small needle and thin black silk. An adhesive strip drawn from

the anterior surface of the pinna over the helix and stretching backward over the posterior surface of the auricle, completes this plastic.

*The correction of exaggerated size of the lobule:—*

The preponderance of adipose tissue of the lobule either in length or in width produces a very unsightly ear, and when this is unilateral cosmetic correction is justifiable. As the lobule is constructed entirely of soft tissues and quite vascular, it may be easily reduced in length or width by a simple resection of a wedge-shaped piece, and the approximation of the edge by one or two sutures; the parts are vascular and heal promptly.

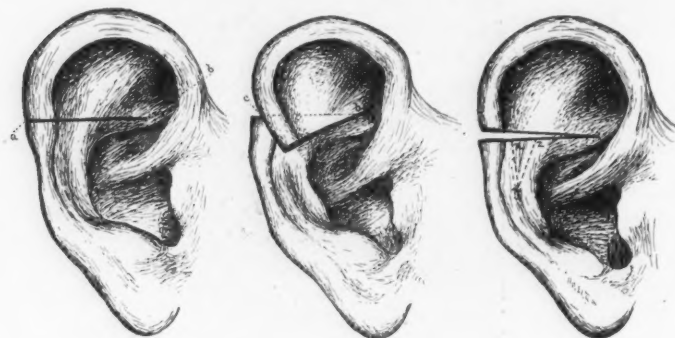


Figure 1.

Figure 2.

Figure 3.

Plate 1.

Usual technique for Reducing Macrotia.

*The correction of synechia of the lobule:—*

This abnormality in the shape of the ear is very frequently met with, and is at times sufficiently marked to cause the patient to ask for its correction. The following method is suggested to rectify adhesion of the lobule:

Raise the flap *a b* in front of the ear (plate IV, figure 1), with its base attached to the lobule, and dissect it up to a line corresponding with the normal perpendicular of the lobule. On the posterior surface of the lobule raise the flap *c d* (figure 2), having its base attached to the extended insertion line of the auricle on the neck. Divide the lobule along the line *e f* (figure 3), check the

bleeding by hot compresses or adrenalin; with the flap *a b* cover the exposed posterior surface of the lobule, and with the flap *c d* of similar length and shape the wound surface of the neck is covered. If the flaps have been carefully shaped and are nicely adjusted they may be held in position by aseptic adhesive strips without suture.

There have been other methods presented for operative plastic on the ear, some of which appear impracticable; others too complicated to produce thorough coaptation of wound surfaces, and pro-

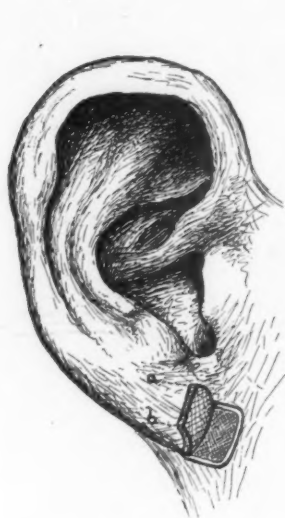


Figure 1.



Figure 2.



Figure 3.

Plate IV.

Radical Correction of Synechia of the Lobule.

ductive of unsightly scars; and some few even impossible. I have confined myself to a description and selection of such methods of operative technique as may be legitimately and safely carried out, and which will yield satisfactory results.

#### PLASTIC SURGERY OF THE AUDITORY CANAL.

Perhaps the most important use to which plastic surgery has been put in otology is the construction of the skin-flap shaped from the membranous anterior canal wall, and utilized in lining

the greater part of the excavated bone cavity, following the radical mastoid operation. The proper means of obtaining epidermization of this large bone cavity still forms one of the much discussed problems of the radical operation.

The history of plastic surgery of the mastoid dates back to 1899, when the Stacke modification of the Schwartze operation was first presented. The character of the technique of the Stacke modification demanded that the exposed bone cavity so produced be covered in some way, or reconstructed from some tissue to insure a permanent healing of the wound. In the Stacke operation, where the tympanic cavity proper is exposed and operated upon before the antrum is reached, where the membranous auditory canal is stripped from the bone, and where a considerable resection of bone is made, it is evident that some measure must be undertaken to cover the newly exposed bone surfaces.

It first occurred to Stacke to utilize the membranous auditory canal as an epidermal lining for the exenterated bone cavity, and the first plastic method associated with the mastoid operation consisted of simply splitting the plastic canal wall by a longitudinal incision in the median line, reaching from the fundus to the concha. This produced an upper and lower triangular flap, but because of the resiliency of the cartilaginous part of the canal wall and the insufficient size of the flaps so obtained, an improved plastic method was offered by Stacke, and later modified by Jansen, now known as the Stacke-Jansen plastic. (Stacke Plastic, plate V.)

The Stacke-Jansen plastic consists of a longitudinal incision through the superior wall of the auditory canal from the fundus to the concha. At right angles to this incision at the concha end a second incision is made, forming a rectangular flap, the full size of the posterior canal wall. This flap is pulled downward and backward to cover the lower area of the exenterated bone cavity. Jansen holds the flap in position by forceps or a narrow chisel, and introduces the gauze packing through the enlarged auditory canal, thereby holding the flap in its new position. (Plate VI.)

The Panse plastic is a substantial modification of the Stacke flap; the first incision is made longitudinally along the median line of the posterior canal wall, extending from the fundus to the concha; at the exterior end of this incision a perpendicular incision is made, forming an elongated letter T; or in other words, a longitudinal median incision, with two right angle flaps, one ending in the superior line of the canal wall, and the other in the inferior line.

One flap is turned upward and lines the superior portion of the bone cavity; the second flap is turned downward and lines the posterior wall and floor of the bone cavity. This plastic admits of the largest possible area for inspection of the field of operation. Panse recommends that in the making of the flap incision a pair of forceps should be passed into and throughout the length of the external auditory canal, and the posterior wall divided while stretched over the open blades of the forceps.

Another procedure which has proven of much value in a large number of cases, where the resiliency of cartilage has interfered with the proper coaptation of the flaps of the bone surface, was suggested by Panse: when the T-shaped incision has been made the right angle corner of each flap is lifted up between delicate forceps and the underlying cartilage and connective tissue is carefully cut away with curved scissors, producing thinner and much more easily adjusted flaps; these may either be sutured into position or be held in place by gauze tampons. (Plate VII.)

The Körner flap is the plastic of choice of the majority of operators to-day, because of its simplicity of technique, and because the single, tongue-shaped flap affords the largest area to cover the exterminated cavity. The Körner flap consists of two parallel incisions through the membrano-cartilaginous canal, one along the upper border and one along the lower border of the posterior canal wall. To facilitate proper coaptation and adjustment of this flap, especially where there is a redundancy of cartilaginous and subcutaneous tissue, the under surface may be very materially pared down, and the stiff cartilaginous sub-structure dissected away. Care must be taken in the preparation of this flap to make a thoroughly clean dissection so that no particles of poorly nourished cartilage remain for subsequent sloughing. (Plate VIII.)

An active enchondritis following the various plastic methods in the radical mastoid operation may take place and may give rise to most marked and irreparable deformities of the auricle. (Figure 16.)

Siebermann has presented a modified plastic by which the median incision in the canal wall is extended upwards and downwards to form a triangular or Y-shaped secondary flap in the depth of the concha. This flap suffers additional difficulties in technique, and, as a rule, the membranous canal is not large enough to construct a triangular flap of sufficient size and tissue to be of any practical significance. (Plate IX.)

The Ballance flap is a more recent modification, and is especially adapted to the radical mastoid technique, as suggested by Ballance, together with his plan for subsequent skin-grafting. The Ballance incision is of the shape of a shepherd's crook. A median incision is made through the posterior canal wall, extended from the tympanic end to the concha, and ending in a semicircular incision encroaching far into the concha, the curve of the incision being downwards. This produces a large, irregular shaped flap superiorly, and a smaller inferior flap. Ballance prefers to suture his flaps into position. Ballenger recommends an anchor suture, held in place by little rolls of gauze, as a modified technique, to hold these sutures in position. (Plate X.)

It may be observed that the majority of operators to-day prefer not to suture the flaps in the radical mastoid operation, but depend for the adjustment of same on dressings and gauze packs. By omitting the suture there is one less possibility of infection, and the time of the operation is somewhat shortened.

There are other modifications in the formation of the plastic flaps used in the radical mastoid operation, as suggested by Kretschmann, Neumann, Passow and others, but the principal modifications have been here enumerated.

#### PLASTIC SURGERY OF RETRO-AURICULAR FISTULA.

In a large number of cases where the radical mastoid operation has been performed, conditions may be present where it is unadvisable to close the entire posterior wound, and conduct the entire after-treatment through the enlarged anterior opening. Where cholesteatoma has been found, where extensive sloughing of the soft parts over the mastoid area has taken place, where bone necrosis has been active, especially when associated with syphilis tuberculosis or other constitutional dyscrasia, where dura or sinus has been exposed or opened, or where for any definite reason the operator finds it necessary to critically inspect the exenterated area during the healing process, the posterior wound must be carefully packed and allowed to granulate from the bottom, and the after-treatment conducted similar to the plan employed in the classic Schwartze operation. In this class of cases it will frequently be found, where granulation and cicatrization have taken place, that a well-defined fistula, varying in shape, depth and diameter, has been established.



The disposal of such post-auricular fistulae is often a troublesome matter to the surgeon. It is a safe plan not to undertake the plastic closure of such fistulae until the operative field has been thoroughly healed and the parts thoroughly epidermized or cicatrized and freed from wound secretions.

The first description of plastic closure of retro-auricular fistulae is presented by von Mosetig-Moorhoff (*Monatsschrift f. Ohrenheilkunde*, 1899, Heft 1). The operation is performed under careful asepsis and general anesthesia, a tongue-shaped flap is made below the retro-auricular opening, the size of the flap constructed being somewhat larger than the fistulous opening. The flap is carefully dissected up, so that a smooth underlying wound surface may be exposed. An incision is next made round the circumference of the fistula, and a free and freshened edge is produced by knife and elevator. The tongue-shaped flap is now lifted from its bed and inverted into the fistulous opening, care being taken to preserve the hinge-like flap in its integument attachment to the lower edge of the fistula. By the inversion of the flap into the retro-auricular opening the epidermis presents inward and the wound surface outward. The flap edges are now adjusted to the freshened and elevated edges of the retro-auricular opening by four catgut sutures. The edges of the lower wound, from which the flap has been taken, are now approximated by two or three sutures. The raw surface of the flap presenting externally, is either covered with skin grafts or allowed to cicatrize, the author preferring the latter method. See plate XI.

Another form of plastic was suggested by Trautmann (*Archiv f. Ohrenheilk.*, Bd. XLVIII, Heft 1). Trautmann performs this operation by means of infiltration anesthesia. He creates two flaps of equal size, taking these from the lateral periphery of the retro-auricular opening; these flaps are crescent-shaped and measure four mm. at their widest point. The anterior flap includes the perichondrium; the posterior flap includes the periosteum; these flaps are turned inward to cover the post-auricular opening, and their edges approximated by four thin catgut sutures, as indicated in figure 2, plate XII. In placing the sutures the author emphasizes the practical value of passing the needle in and out of the same side, as he finds it a much simpler technique, and can adjust the position of his suture points much more easily than by using the needle from one side to the other. The next step in the operation is to elevate the skin about the freshly made circumference, as indicated in

figure 3, plate XII. Three sutures are now placed in position from side to side, and the skin drawn over the surfaces of the newly constructed flaps, and the edges approximated in the median line. The advantages claimed for this form of plastic are:

- (a) That it admits of the plastic closure of larger openings.
- (b) That no wound surface remains exposed.
- (c) That the reinforcement created by the underlying flaps and the overlying integument produces a firmer closure of the retro-auricular opening.



Before Operation.



After Operation.

Figure 17.

Polyotia and Macrotia with Congenital Aural Fistula.

(Case of Dr. W. D. Black.)

There are several points in criticism of these plastic operations which I desire to offer, and for which I present another form of operation, the results of which practically substantiate my position.

The retro-auricular fistula is the result of necessity, and not of choice. It occurs most frequently after extensive bone exenteration; it is produced by our reluctance to entirely close the posterior wound in order to keep the field of operation thoroughly under observation and control. Under these circumstances the wound heals more slowly, and frequently with extensive cicatrization, binding

the dermal tissues tight to the underlying and frequently deeply excavated bone.

The clinical picture of such a retro-auricular opening is not often as simple and favorable to post operation plastic, as is presented in the technique of Mosetig-Moorhoff or Trautmann. Sometimes the cicatrized tissue is so extensive and the excavated bone area of the mastoid so deep that it is a practical impossibility to construct the flap of healthy skin below the retro-auricular opening, because no healthy skin can be found there. Often the stellate cicatrization spreads about the circumference of the retro-auricular opening so freely that it is not surgically possible to construct the crescent-shaped bi-lateral flaps of Trautmann at a distance of four mm., or even of six or eight mm., from the periphery of the opening.

*Author's Retro-Auricular Plastic.*

The technique which I have carried out in a number of cases where such unfavorable conditions for plastic exist, is simple. I select the area where healthy skin joins cicatricial tissue, make an incision through the integument anteriorly to the perichondrium and posteriorly through the periosteum. The shape and length of this incision varies with the character of the cicatrix and the size of the wound. With a slender elevator, such as is used in the sub-mucous resection of the nasal septum, the skin and perichondrium over the auricle anteriorly, and the skin and periosteum over the mastoid area posteriorly is elevated until sufficient tissue has been loosened to allow approximation of the two edges, with the least amount of tension.

The next step in the technique is identical with that used in the primary closure of the posterior wound following the radical mastoid operation. The two edges of the skin are carefully drawn together and held in position by the Michel metal clamps, the number of clamps used depending on the length of the wound. The underlying cicatricial tissue is not disturbed. The vertical incisions made to relieve tension are allowed to granulate in their gaping areas.

Two vertical incisions, each of about fifteen to eighteen mm. in length, are then made at a distance of about ten to twelve mm. from the freshened margins of the wound, the anterior incision extending through the perichondrium and the posterior incision through

the periosteum. The elevated tissue should extend to the lines of incision. By means of these incisions all possible tension when the wound edges are drawn together, is corrected.

This is a simplified technique, offering none of the disadvantages which are occasionally met in the methods of Mosetig-Moorhoff or Trautmann. In two or three cases the auricle has been drawn somewhat closed to the side of the head, because of the larger lateral diameter of the post-auricular fistulo.

The successful closure during the past five years of some fifteen or sixteen retro-auricular openings of various sizes justifies me in presenting this simple plastic technique.

The work that is represented in this paper is by no means exhaustive of the subject matter of cosmetic and plastic surgery as applied to the ear, but offers in a comprehensive way a critical summary of the most practical suggestions which have been gleaned from personal experience and from a careful search of modern surgical literature.

I believe this field to be a rational and logical department of surgery for the progressive, ambitious and skillful ear surgeon, if the cases are selected with care. If good judgment is exercised in the correction of marked aural deformities, the work of cosmetic surgery of the ear may be carried on with dignity, and may afford many opportunities for originality and a demonstration of excellent technical ability.

The plastic surgery of the ear as applied to the mastoid operation and to the conduct of retro-auricular wounds is a classic field and our future attainments in this important chapter of aural surgery will depend largely on our perfection of the plastic work associated with the mastoid operation.

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